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# Agricultural Airplane Mission Time Structure Characteristics

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National Aeronautics  
and Space Administration

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## SUMMARY

A study of the time structure characteristics of agricultural airplane missions has been made by using records from NASA VGH flight recorders. Results from the study indicate flight durations varied from less than 3 minutes to more than 103 minutes. There was a significant reduction in turning time between spreading runs as pilot experience in the airplane type increased. Spreading runs accounted for only 25 to 29 percent of the flight time of an agricultural airplane. Lowering the longitudinal stick force appeared to reduce both the turning time between spreading runs and pilot fatigue at the end of a working day.

## INTRODUCTION

The primary elements of the time structure of an agricultural flight are total flight time, ferry time, spreading time, and turning time. A knowledge of these values is necessary not only to the airplane designer to enable valid estimates to be made of the task requirements of the airplane but also to the operator to provide reasonable estimates of the utility that may be expected from the airplane. Since NASA VGH flight recorders have been installed on agricultural airplanes for a number of years, such data were readily available; accordingly, records from 12 airplanes representing light-piston-powered, heavy-piston-powered, and heavy-turbine-powered classes have been analyzed and the results are reported herein. Other studies relating to time analysis of agricultural flights are given in reference 1.

## INSTRUMENTATION

Data used in the analysis were obtained from NASA VGH flight recorders installed on agricultural airplanes used in actual operations. These recorders provide a time-history record of indicated airspeed (V), normal acceleration (G) at or near the center of gravity of the airplane, and pressure altitude (H). Photographic paper 2 3/4 inches wide and 175 feet long is used for the recording medium and is transported in the recording drum at a speed of 1/2 inch per minute (about 70 hours total recording time). The recorder base and drum have a combined weight of 17 pounds and the remote accelerometer has a weight of 2 1/4 pounds. A complete description of the recorder is given in reference 2.

## METHOD OF ANALYSIS

### Airplane Selection

Only VGH records from airplanes specifically designed for agricultural operations were used in the study. Eight types of airplanes, whose operations, characteristics, and sample sizes are listed in tables I and II, were selected to provide representative data. The eight airplane types are identified by the numbers 1 through 8, with types 4 through 8 divided into a and b sets for comparative purposes. Airplane types 1, 2, and 3 are in the light-piston-powered class (A); types 4, 5, and 6 are in the heavy-piston powered class (B); and types 7 and 8 are in the heavy-turbine-powered class (C). Twelve individual airplanes were used in the data sample:

three in the light-piston-powered class flown by operators in Texas, Louisiana, and Montana; six in the heavy-piston-powered class flown by two operators in Arizona, two in Texas, one in California, and one in Oregon; and three in the heavy-turbine-powered class flown by one operator in Alabama and two operators in Texas.

### Data Identification

An example of a typical agricultural flight as it appears on the VGH record is shown in figure 1. Pertinent traces and trace responses are identified in the figure. Each flight on the VGH record was identified as a spreading or cross-country flight. Only spreading flights were evaluated. Each flight was divided into three basic segments - ferry, spreading runs, and turns between spreading runs - and the time flown in these segments was determined in seconds and recorded. Flight time was considered to be the elapsed time from lift-off to landing touchdown.

Identification of the ferry, spreading runs, and turns between the spreading runs was made on the VGH record by correlating responses of the altitude, acceleration, and airspeed traces. Ferry time is defined as that portion of flight from lift-off to the start of the first spreading run and from pull-up at the end of the last spreading run to landing touchdown. For flights where two or more fields are worked, the time from pull-up on the last spreading run at one field to the start of the first spreading run on the next field was also considered ferry time.

Turning time between spreading runs is identified as the time consumed in maneuvering the airplane from its position at the end of one spreading run to its position at the start of the next spreading run. The timing of turns between spreading runs on the VGH records was aided by the easily recognized spreading runs discussed in the next paragraph.

Spreading runs are defined as the segment of an agricultural flight in which seeds or chemicals are released from the airplane to sow or protect crops. They are identified on the VGH record by regular, flat portions of the altitude trace; by the relatively steady 1.0g position of the acceleration trace during the spreading run; by the increase in airspeed prior to the start of the spreading run; and by the sharp decrease in airspeed at the end of the spreading run. Spreading time was not measured directly from the VGH record as were ferry time and turning time; instead it was determined by adding the ferry and turning times and subtracting this summation from the flight duration.

In addition to determining the ferry, spreading, and turning times, the number of spreading runs and the number of turns between spreading runs were also recorded for each flight.

### Data Analysis

Although the data sample for the analysis varies considerably between airplane types and is relatively small (represents less than one season, 331.6 hours with 18 780 spreading runs) compared with samples used in flight load analyses, it is considered of value for documenting pertinent agricultural mission time characteristics.

A detailed record of the mission time characteristics exhibited by different airplane types and weight classes is given in tables III and IV. Data samples were arranged into groups of flights having multiples of five spreading runs. These groups are noted in the extreme left column of both tables. The following information is given for each group: the number of flights; the number of spreading runs; the number of turns between spreading runs; the maximum, minimum, and average flight time, ferry time, spreading time, time per spreading run, turning time, and time per turn; and the percent of flight time used for ferry, spreading runs, and turns between spreading runs. The data are summarized for each particular sample at the bottom of each table. These tables form a logical array of information pertinent to the flight operations of each airplane type and weight class, and they provide the major basis for analysis of the different data sets.

The maximum and minimum values in tables III and IV for the spreading time per run and for the turning time per turn are for individual flights in each group. They were obtained by dividing the total run (or turn) time for each flight by the total number of runs (or turns) in the flight. The maximum and minimum values are presented primarily to indicate the weighted limits of the average values.

In order to show the effects of pilot experience, of control force changes, or of different operators on agricultural airplane mission time characteristics, the data from airplane types 4 through 8 were separated into a and b sets. These sets are noted in table I for each airplane type.

Figures 2 through 10 are histograms of mission characteristics exhibited by the different airplane types and classes given in tables III and IV. Data for the figures were taken from tables III and IV and represent the total data sample for each type or class of airplane. The histograms were used to facilitate comparison of data from one type or class of airplane with another.

## RESULTS AND DISCUSSION

Results from the analysis are discussed in the following order: flight time, ferry time, spreading time, turning time, and flight profiles. Of primary interest are the variation in flight time for different tasks by the same or different airplane types; the variation in ferry time, spreading time, and turning time; and the percent of an agricultural flight time used for ferry, spreading runs, and turns between spreading runs.

### Flight Time

The variation of flight time with the number of spreading runs made per flight for different types and classes of airplanes is given in tables III and IV. In general, flight time varies directly with the number of spreading runs; however, because of longer ferry distances, longer spreading runs, or different patterns flown to set up spreading runs, some flights with less spreading runs are longer in duration than other flights with more spreading runs. A comparison of the flight duration for different airplane types and classes is given in figure 2. The data are presented in bar-graph form and show the maximum, minimum, and average flight times for the individual airplane types and the three classes.

The longest flight time, 103.3 minutes, was recorded by airplane type 1, the smallest airplane in the data set. The shortest flight time, 2.7 minutes, was recorded by airplane type 2, also one of the smallest airplanes in the data sample. A comparison of maximum and minimum flight times for the eight airplane types shows relatively large variations in the maximum flight times but small variations in minimum flight times. This suggests that the minimum spreading time, regardless of type, is about 3 minutes and one or more of these short flights can be expected during a season's operation. The relatively large differences between the minimum and the maximum flight times indicate the random nature of the operational requirements for agricultural airplanes. Although some of the airplanes recorded maximum flights of less than 30 minutes, others recorded flights in excess of 100 minutes. Figure 2(a) indicates that only types 1 and 8 had average flight times of more than 20 minutes, and three of the airplanes had flight times of less than 10 minutes. If flight time for all airplanes in the data sample is summed and divided by the total number of flights, the average flight time is 15 minutes.

The variation in flight time for the light-piston-powered, heavy-piston-powered, and heavy-turbine-powered classes of airplanes is shown in figure 2(b). Airplanes in the light-piston-powered and heavy-turbine-powered classes recorded the longest flight times - slightly more than 100 minutes - whereas the heavy-piston-powered class of airplanes had maximum flight times of about half that. The minimum flight time, 2.7 minutes, was practically the same for all three categories of airplanes; this indicates that all the categories have requirements for short flights. Average flight times varied between 13 and 18 minutes with the longest flight recorded by the light-piston-powered airplanes and the shortest by the heavy-piston-powered airplanes. These differences in the average flight times suggest that no correlation exists between airplane class and flight time.

#### Ferry Time

The time required to fly to, from, and between work areas (ferry time) is of interest to both the airplane designer and the operator. These data are of interest to the designer because of the relatively light maneuver accelerations experienced in this period of the flight compared with the severe maneuver accelerations required during spreading operations and to the operator because of flight planning and monetary considerations.

As indicated by table III, there is no correlation between ferry time and the number of spreading runs made during a flight or between ferry time and flight time for a specific airplane type. Figure 3 shows the maximum, minimum, and average ferry times for the individual airplane types and for the three classes of airplanes. The longest maximum, minimum, and average ferry times were recorded by airplane type 8, one of the heavy-turbine-powered airplanes. This result was expected, since an airplane such as type 8 would be expected to be used for jobs at more distant locations from the base of operations; however, examination of the data from airplane type 7, another heavy-turbine-powered airplane, shows that it recorded the shortest maximum and average ferry times of all the airplanes considered. These differences illustrate the wide variety of applications in which the heavy-turbine-powered agricultural airplanes are utilized. A comparison of ferry times for the three weight classes of airplanes shows that the longest ferry time, 80 minutes, was recorded by airplanes in the heavy-turbine-powered class and the shortest, about 0.5 minute, was recorded by airplanes in the light-piston-powered class. The average ferry time for



all three classes of airplanes was about 5 minutes; this indicates that most of the fields worked, regardless of the airplane weight class, were within 2 1/2 minutes of the base of operations.

### Spreading Time

The portion of an agricultural flight utilized for spreading runs represents the single most important phase of the flight - that period in which the airplane is performing the function for which it was designed. The amount of time consumed spreading chemicals or seeds on an agricultural flight and the average time required per spreading run for each airplane type and class are given in tables III and IV. In general, spreading time varies directly with the number of spreading runs; however, because of variations in field sizes and application speeds, some flights with fewer spreading runs require longer spreading times.

A bar graph of the time per flight for spreading runs is shown in figure 4. Data were taken from tables III and IV and represent the total data sample for each airplane type and class. The data show that, with the exception of type 1, the majority of the individual airplane types have maximum spreading times of less than 18 minutes and average spreading times of less than 5 minutes. All airplanes except type 1 recorded minimum spreading times of less than 1 minute. A comparison of spreading times for the three classes shows the heavy-piston- and heavy-turbine-powered classes to be quite similar with maximum spreading times per flight of about 15 minutes and average spreading times of 4 minutes. Airplanes in the light-piston-powered class (type 1) recorded maximum spreading times of 38 minutes and average spreading times of around 5 minutes. Minimum spreading times for airplanes in the three classes were less than 1 minute. When data from all airplanes in the sample were combined, the overall average spreading time per flight was about 4 minutes. The increased spreading time for airplanes in the light-piston-powered class is believed to result from lower spreading speeds and from more spreading runs per flight. (See tables II and IV(a).)

If the average time per spreading run for the different airplane types and classes is known, some idea is gained on the distribution of field sizes worked in the data sample. This information is provided by figure 5 and shows that the longest spreading runs were slightly over 50 seconds and the shortest runs were around 4 seconds. VGH records from airplanes of the same type as listed, but whose data were not evaluated in depth, have shown spreading runs as long as 2 minutes 45 seconds and as short as 3 seconds. For the data presented herein, average run times vary between 13 and 21 seconds for the individual airplane and between 16 and 19 seconds for the three classes of airplanes.

### Turning Time

The data in table III show that, as the number of spreading runs in a flight increase, the portion of the total flight time required for turns between runs also increases. There are exceptions to this, however, since different field shapes and obstructions around the field mandate changes in turn patterns flown between the runs. The time to turn from one spreading run to the next appears to be random and is not affected by the number of runs made per flight. The time per flight for turns between spreading runs for different airplane types and classes is shown in figure 6. These data indicate that relatively large variations exist between maximum values for the eight types of airplanes and between maximum and minimum values for

specific airplane types. Differences were also relatively large between the average time per flight for turns between spreading runs for the individual airplane types. When the airplanes were grouped into classes, only maximum turning time for the light-piston-powered class (strongly influenced by aircraft type 1) was significantly different, about twice the turning time recorded by the heavy-piston- and heavy-turbine-powered classes. (See fig. 6(b).)

The maximum, minimum, and average times per turn between spreading runs for the different airplane types and classes are given in figure 7. Turning times varied from a maximum of 52 seconds for airplane type 8 to a minimum of about 15 seconds for airplane type 7. Average time per turn for the individual airplane types was between 24 and 36 seconds. Smaller differences were evident between turning times for the three airplane classes. Differences between maximum times were about 6 seconds, and between minimum times, 1 1/2 seconds. Average time per turn between spreading runs was 28 seconds for airplanes in the light- and heavy-piston-powered classes and 24 seconds for those in the heavy-turbine-powered class.

The effect of pilot experience in a given airplane type on the time per turn between spreading runs is illustrated by comparing the time per turn listed in table III(d) with similar information in table III(e). The data in table III(d) represent the initial flights made after purchase of airplane type 4. Data in table III(e) were taken from the same airplane flown by the same pilot 3 months later. Since care was taken to compare flights with reasonable likenesses (flight time and number of turns per flight), the decrease in turning times from table III(d) to table III(e) may be attributed to increased pilot familiarity with the handling characteristics of the airplane. A comparison of the overall average time per turn for the initial data in table III(d), 39.6 seconds per turn, with the later data in table III(e), 32.4 seconds per turn, indicates a decrease in time per turn of 7.2 seconds, which is a significant reduction. Maximum and minimum turn times showed similar reductions.

The effect of an elevator antiservo tab on the time per turn is indicated by comparing the data for time per turn in table III(m) with those in table III(n). Data in table III(m) were taken with the elevator antiservo tab disconnected (lower stick force), and data in table III(n) were obtained with the same airplane and pilot but with the antiservo tab connected (higher stick force). Flights which had similar characteristics were chosen for the comparison (similar flight times and a comparable number of spreading runs). Examination of the data shows that, with the antiservo tab connected, the time per turn was more than with the tab disconnected. There were flights in which turning times were less with the antiservo tab connected; statistically, however, this should be expected since variations in field sizes, perimeter obstructions on the fields being worked, or differences in the pattern being flown to work the fields influence the rate of turn. Overall, however, the average time per turn between spreading runs was 2.6 seconds less when the antiservo tab was disconnected.

One explanation for the differences in turning time may be pilot fatigue. Because of the many pull-ups, push-overs, and turning maneuvers agricultural pilots make (1 to 2 orders of magnitude more than in any other type of operation), the pilot's arm is weakened after several hours of operation. (See ref. 3.) When work-days of 8 to 10 hours are encountered, the pilot is physically unable in the latter part of the day to maintain control-stick back pressures equivalent to those used during the first part of the day; consequently, more time is required to make the turn. Telephone conversations with the pilot confirmed that there was a significant increase in physical fatigue when the elevator antiservo tab was connected.

## Flight Profiles

Agricultural flights are composed of three primary segments: ferry time (time of flight to, between, and from work areas); spreading time; and turning time between spreading runs. The relationship of these time segments, one to the other, relates to the effectiveness of the flight. Ideally a working flight should have minimum ferry and turning times and maximum spreading time.

The variation in the percent of flight time used for ferry, spreading, and turns by airplane type and class is given in tables III and IV. Figures 8, 9, and 10 present the data sample for each type and class of airplane and give the maximum, minimum, and average percent of the flight time used for ferry, spreading, and turns between spreading runs. These figures allow a comparison of the percent flight time consumed in each flight by the different types and classes of airplanes. By considering first the individual aircraft types and comparing the three phases of the flight, the figures show that all airplanes, except type 1, spend the largest percent of their flight time ferrying the airplane and making turns between spreading runs. The smallest percent of an agricultural flight is used for spreading runs. The exception to this was airplane type 1, which used 37 percent of its flight time for spreading runs, 17 percent for ferrying, and 46 percent for turns between spreading runs.

The relatively large variations in flight profiles - even for a specific airplane type - indicate the breadth of requirements imposed on agricultural airplane operations. Examination of figures 8(a), 9(a), and 10(a) shows ferry differences of from 6 to 78 percent of the flight time, spreading differences of from 6 to 46 percent of the flight time, and turning differences of from 15 to 70 percent of the flight time.

When data from the individual airplane types are grouped into light-piston-, heavy-piston-, and heavy-turbine-powered classes, figures 8(b), 9(b), and 10(b) show that the largest variations in the percent of agricultural flight time are used ferrying the airplanes to, from, and between work areas and in making turns between spreading runs. The smallest variation between the three classes of airplanes was experienced in spreading times. Figures 8(b), 9(b), and 10(b) also show that the average percent of the flight time for ferrying, spreading, and turning was, respectively, 31, 29, and 40 percent for light-piston-powered airplanes; 31, 25, and 44 percent for heavy-piston-powered airplanes; and 38, 25, and 36 percent for heavy-turbine-powered airplanes. If comparison is made of the percent ferry, spreading, and turning times (33, 27, and 40, respectively) for the complete data sample, it is seen that the largest portion of an agricultural flight is consumed making turns between spreading runs.

Overall the data indicate larger differences within given classes than between different classes of agricultural airplanes; this again indicates the wide range of task requirements faced by agricultural airplanes, regardless of airplane class. The most efficient operation - if efficiency is defined as spending the largest percent of a flight on spreading runs - was recorded by airplanes in the light-piston-powered class; however, even these airplanes spent only 29 percent of their flight on spreading runs.

## CONCLUSIONS

An analysis of the mission time structure characteristics of eight types of agricultural airplanes based on a data sample of 331.6 hours and 18 780 spreading runs suggests the following conclusions:

1. Agricultural airplanes spend the smallest portion of their flight, from 25 to 29 percent, doing that for which they were designed - spreading seed or chemicals. On a time basis, spreading time per flight varied from less than 1 to about 38 minutes, with an overall average of 4 minutes.
2. A significant reduction in turning time between spreading runs occurs as pilot experience in a new airplane type increases.
3. A reduction in turning time between spreading runs was achieved on one airplane type by disconnecting the elevator antiservo tab which lowered the stick force necessary for a given turn rate. Pilot comments indicated that because of the lower stick force there was a significant reduction in pilot fatigue at the end of a working day.
4. Relatively large differences are evident between the maximum flight times for the different airplane types; however, for all types the minimum flight time was about 3 minutes. When the data were combined, the overall average flight time was 15 minutes.
5. Although ferry times varied from 0.5 to 80 minutes, the average was about 5 minutes; this indicates that most of the fields worked were within 2 1/2 minutes of the loading area.
6. The percent of an agricultural flight consumed in turns between spreading runs ranged from 15 to 70 percent and averaged 40 percent, the largest of the three basic flight phases.

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TABLE I.- AIRPLANE OPERATIONS

| Airplane type | Airplane class | Number of airplanes   | Number of operators | Number of pilots                                     | State of home base                  |
|---------------|----------------|---|---------------------|--|-------------------------------------|
| 1             | Light piston   | 1   | 1                   | 1  | Texas                               |
| 2             | Light piston   | 1   | 1                   | 1  | Louisiana                           |
| 3             | Light piston   | 1   | 1                   | 1  | Montana                             |
| 4             | Heavy piston   | 1   | 1                   | 1 { a No experience in type<br>b Experienced in type | Arizona                             |
| 5             | Heavy piston   | 3   | 3                   | 3  | { a 1 in California<br>b 2 in Texas |
| 6             | Heavy piston   | 2   | 2                   | 2  | { a 1 in Arizona<br>b 1 in Oregon   |
| 7             | Heavy turbine  | 1 { a Antiservo tab disconnected<br>b Antiservo tab connected | 1                   | 1  | Texas                               |
| 8             | Heavy turbine  | 2   | 2                   | 2  | { a 1 in Alabama<br>b 1 in Texas    |

TABLE II.- AIRPLANE CHARACTERISTICS AND DATA SAMPLE SIZE

| Characteristics                  | Airplane types and classes |           |           |              |           |          |           |           |           |               |           |            |            |
|----------------------------------|----------------------------|-----------|-----------|--------------|-----------|----------|-----------|-----------|-----------|---------------|-----------|------------|------------|
|                                  | Light piston               |           |           | Heavy piston |           |          |           |           |           | Heavy turbine |           |            |            |
|                                  | 1                          | 2         | 3         | 4a           | 4b        | 5a       | 5b        | 6a        | 6b        | 7a            | 7b        | 8a         | 8b         |
| Maximum gross weight, lb .....   | 2900                       | *4000     | *4200     | *6900        | *6900     | *6000    | *6075     | *6000     | *6900     | *6075         | *6075     | *8200      | *8200      |
| Wing area, ft <sup>2</sup> ..... | 183.0                      | 202.0     | 205.0     | 270.6        | 270.6     | 326.0    | 328.0     | 326.6     | 326.6     | 328.0         | 328.0     | 326.6      | 326.6      |
| Wing span, ft .....              | 36.2                       | 40.7      | 41.7      | 45.1         | 45.1      | 35.7     | 35.9      | 44.3      | 44.4      | 35.7          | 35.7      | 44.4       | 44.4       |
| Length, ft .....                 | 24.7                       | 26.3      | 26.3      | 27.0         | 27.0      | 24.5     | 24.3      | 27.5      | 29.4      | 27.0          | 27.0      | 33.0       | 33.0       |
| Height, ft .....                 | 7.2                        | 7.8       | 7.7       | 8.5          | 8.5       | 10.8     | 10.8      | 8.6       | 9.2       | 11.0          | 11.0      | 9.2        | 9.2        |
| Hopper capacity, gal .....       | 150                        | 200       | 280       | 320          | 320       | 300      | 300       | 300       | 400       | 300           | 300       | 400        | 400        |
| Type propulsion .....            | Piston                     | Piston    | Piston    | Piston       | Piston    | Piston   | Piston    | Piston    | Piston    | Turbine       | Turbine   | Turbine    | Turbine    |
| Horse power .....                | 235                        | 300       | 300       | 600          | 600       | 600      | 600       | 650       | 600       | 750           | 750       | 750        | 750        |
| Flight time, hr .....            | 61.0                       | 38.6      | 29.3      | 15.6         | 15.3      | 2.6      | 17.8      | 35.4      | 26.2      | 14.3          | 14.0      | 26.1       | 35.2       |
| Spreading run:                   |                            |           |           |              |           |          |           |           |           |               |           |            |            |
| Time, hr .....                   | 22.5                       | 7.7       | 6.8       | 2.9          | 3.5       | 0.5      | 5.1       | 10.4      | 6.2       | 4.6           | 4.0       | 7.4        | 6.8        |
| Speed, knots .....               | 66 to 80                   | 85 to 109 | 80 to 107 | 92 to 110    | 93 to 115 | 72 to 90 | 85 to 105 | 85 to 105 | 85 to 112 | 85 to 105     | 90 to 107 | 91 to 135  | 94 to 131  |
| Ferry:                           |                            |           |           |              |           |          |           |           |           |               |           |            |            |
| Time, hr .....                   | 10.4                       | 19.5      | 9.9       | 3.6          | 4.3       | 1.3      | 6.0       | 8.3       | 11.4      | 4.4           | 4.1       | 8.2        | 17.7       |
| Speed, knots .....               | 63 to 79                   | 85 to 105 | 80 to 100 | 90 to 105    | 90 to 105 | 70 to 90 | 90 to 105 | 75 to 100 | 85 to 110 | 75 to 105     | 85 to 104 | 115 to 135 | 100 to 125 |
| Turn time, hr .....              | 28.1                       | 11.3      | 12.6      | 9.0          | 7.5       | 0.7      | 6.7       | 16.7      | 8.5       | 5.4           | 5.9       | 10.6       | 10.8       |
| Number of flights .....          | 84                         | 252       | 92        | 50           | 49        | 23       | 103       | 151       | 131       | 103           | 103       | 100        | 52         |
| Number of spreading runs .....   | 3891                       | 1625      | 1446      | 871          | 878       | 112      | 941       | 2395      | 1463      | 948           | 938       | 1799       | 1473       |

\* Restricted category.

TABLE III.- OPERATIONAL DATA FROM EIGHT TYPES OF AGRICULTURAL AIRPLANES

(a) Airplane type 1, light piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |        | Spreading time per flight, sec |      |        | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|--------|--------------------------------|------|--------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av     | Max                            | Min  | Av     | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    |                   |                          |                              |                      |      |        |                            |     |        |                                |      |        |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 5 to 10                   | 9                 | 52                       | 43                           | 585                  | 366  | 444.2  | 209                        | 137 | 168.0  | 161                            | 115  | 135.1  | 32.2                        | 15.5 | 23.4 | 254                          | 103  | 141.1  | 32.6               | 25.8 | 29.5 | 37.8                      | 30.4      | 31.8  |
| 10 to 15                  | 6                 | 73                       | 67                           | 1183                 | 710  | 934.3  | 768                        | 251 | 421.0  | 194                            | 130  | 166.0  | 16.9                        | 11.0 | 13.6 | 447                          | 290  | 347.3  | 35.7               | 25.4 | 31.1 | 45.1                      | 17.8      | 37.2  |
| 15 to 20                  | 2                 | 34                       | 31                           | 1253                 | 982  | 1117.5 | 593                        | 489 | 541.0  | 200                            | 145  | 172.5  | 11.1                        | 9.1  | 10.1 | 460                          | 348  | 404.0  | 27.1               | 24.8 | 26.1 | 48.4                      | 15.4      | 36.2  |
| 20 to 25                  | 4                 | 88                       | 82                           | 3113                 | 1305 | 1837.0 | 2045                       | 242 | 832.8  | 703                            | 118  | 391.5  | 33.5                        | 4.9  | 17.8 | 714                          | 471  | 612.8  | 32.1               | 26.2 | 29.9 | 45.3                      | 21.3      | 33.4  |
| 25 to 30                  | 5                 | 134                      | 129                          | 3367                 | 1273 | 1955.8 | 2013                       | 48  | 490.2  | 1009                           | 443  | 764.2  | 34.8                        | 17.0 | 28.5 | 825                          | 538  | 701.4  | 31.3               | 21.5 | 27.2 | 25.1                      | 39.1      | 35.9  |
| 30 to 35                  | 6                 | 190                      | 184                          | 2530                 | 1414 | 1998.7 | 799                        | 83  | 511.2  | 884                            | 557  | 701.8  | 26.7                        | 18.6 | 22.2 | 883                          | 680  | 785.7  | 27.0               | 21.9 | 25.6 | 25.6                      | 35.1      | 39.3  |
| 35 to 40                  | 4                 | 147                      | 142                          | 2364                 | 1546 | 1860.5 | 545                        | 117 | 258.8  | 1078                           | 336  | 619.0  | 29.9                        | 8.6  | 16.8 | 1055                         | 914  | 982.8  | 30.1               | 25.1 | 27.7 | 13.9                      | 33.3      | 52.8  |
| 40 to 45                  | 8                 | 345                      | 336                          | 3761                 | 1770 | 2494.3 | 1216                       | 184 | 420.4  | 1353                           | 507  | 948.4  | 31.6                        | 11.8 | 22.0 | 1272                         | 960  | 1125.5 | 29.6               | 22.9 | 26.8 | 16.9                      | 38.0      | 45.1  |
| 45 to 50                  | 6                 | 283                      | 277                          | 4051                 | 1613 | 2923.0 | 1274                       | 104 | 326.3  | 1617                           | 455  | 1331.3 | 34.4                        | 10.1 | 28.2 | 1659                         | 1050 | 1265.3 | 36.1               | 23.9 | 27.4 | 11.2                      | 45.5      | 43.3  |
| 50 to 55                  | 4                 | 210                      | 205                          | 3002                 | 2873 | 2925.3 | 536                        | 177 | 269.0  | 1461                           | 1130 | 1336.5 | 27.6                        | 21.3 | 25.5 | 1361                         | 1257 | 1319.8 | 26.8               | 24.5 | 25.8 | 9.2                       | 45.7      | 45.1  |
| 55 to 60                  | 1                 | 59                       | 58                           | 3437                 | 3437 | 3437.0 | 489                        | 489 | 489.0  | 1311                           | 1311 | 1311.0 | 22.2                        | 22.2 | 22.2 | 1637                         | 1637 | 1637.0 | 28.2               | 28.2 | 28.2 | 14.2                      | 38.1      | 47.6  |
| 60 to 65                  | 6                 | 376                      | 366                          | 3817                 | 2231 | 3164.0 | 1176                       | 96  | 330.5  | 1705                           | 757  | 1291.2 | 28.0                        | 12.0 | 20.6 | 1758                         | 1378 | 1542.3 | 28.4               | 22.2 | 25.3 | 10.4                      | 40.8      | 48.7  |
| 65 to 70                  | 4                 | 271                      | 266                          | 3806                 | 3346 | 3533.3 | 582                        | 206 | 364.8  | 1637                           | 938  | 1377.5 | 23.7                        | 13.6 | 20.3 | 1963                         | 1673 | 1791.0 | 28.9               | 25.3 | 26.9 | 10.3                      | 39.0      | 50.7  |
| 70 to 75                  | 2                 | 140                      | 138                          | 3782                 | 3160 | 3471.0 | 285                        | 163 | 224.0  | 1645                           | 1386 | 1515.5 | 23.5                        | 19.8 | 21.7 | 1852                         | 1611 | 1731.5 | 26.8               | 23.3 | 25.1 | 6.5                       | 43.7      | 49.9  |
| 75 to 80                  | 4                 | 304                      | 297                          | 4517                 | 3025 | 3934.5 | 600                        | 293 | 444.5  | 2178                           | 1051 | 1648.5 | 29.0                        | 13.6 | 21.7 | 2126                         | 1681 | 1841.5 | 28.3               | 22.7 | 24.8 | 11.3                      | 41.9      | 46.8  |
| 80 to 85                  | 3                 | 248                      | 243                          | 5120                 | 3698 | 4174.3 | 779                        | 369 | 528.0  | 2285                           | 1005 | 1484.3 | 27.5                        | 12.4 | 18.0 | 2399                         | 2010 | 2162.0 | 29.3               | 24.2 | 26.7 | 12.6                      | 35.6      | 51.8  |
| 85 to 90                  | 2                 | 172                      | 169                          | 6200                 | 4727 | 5463.5 | 2400                       | 578 | 1489.0 | 1937                           | 1594 | 1765.5 | 22.3                        | 18.8 | 20.5 | 2212                         | 2206 | 2209.0 | 26.3               | 26.0 | 26.1 | 27.3                      | 32.3      | 40.4  |
| 90 to 95                  | 4                 | 370                      | 364                          | 5203                 | 4360 | 4751.3 | 1125                       | 474 | 850.8  | 1528                           | 1283 | 1425.3 | 16.4                        | 14.9 | 15.4 | 2596                         | 2153 | 2475.3 | 28.7               | 23.7 | 27.2 | 17.9                      | 30.0      | 52.1  |
| 95 to 100                 | 2                 | 193                      | 188                          | 5095                 | 4228 | 4661.5 | 610                        | 285 | 447.5  | 2120                           | 1590 | 1855.0 | 21.9                        | 16.6 | 19.2 | 2365                         | 2353 | 2359.0 | 25.2               | 25.0 | 25.1 | 9.6                       | 39.8      | 50.6  |
| 100 to 105                | 2                 | 202                      | 200                          | 5816                 | 5218 | 5517.0 | 1374                       | 380 | 877.0  | 2183                           | 1720 | 1951.5 | 21.6                        | 17.0 | 19.3 | 2722                         | 2655 | 2688.5 | 27.2               | 26.6 | 26.9 | 15.9                      | 35.4      | 48.7  |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |        |                                |      |        |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 46.3                      | 84                | 3891                     | 3785                         | 6200                 | 366  | 2614.8 | 2400                       | 48  | 454.4  | 2285                           | 115  | 964.8  | 34.8                        | 4.9  | 20.8 | 2722                         | 103  | 1195.5 | 35.7               | 21.5 | 26.5 | 17.4                      | 36.9      | 45.7  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(b) Airplane type 2, light piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |     |      | Turning time per flight, sec |     |       | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|-----|------|------------------------------|-----|-------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min | Av   | Max                          | Min | Av    | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 104               | 372                      | 268                          | 708                  | 162  | 364.8  | 586                        | 32  | 219.0 | 202                            | 20  | 73.8  | 50.5                        | 6.7 | 20.6 | 113                          | 22  | 72.1  | 46.0               | 20.0 | 28.0 | 60.0                      | 20.2      | 19.8  |
| 5 to 10                   | 109               | 741                      | 631                          | 1198                 | 282  | 605.7  | 914                        | 90  | 307.2 | 205                            | 25  | 121.8 | 29.3                        | 5.0 | 17.9 | 310                          | 67  | 176.6 | 44.6               | 16.8 | 30.5 | 50.7                      | 20.1      | 29.2  |
| 10 to 15                  | 32                | 375                      | 343                          | 1805                 | 491  | 816.8  | 918                        | 106 | 326.1 | 432                            | 112 | 167.8 | 30.9                        | 8.1 | 14.3 | 455                          | 210 | 322.9 | 41.6               | 16.9 | 30.1 | 39.9                      | 20.6      | 39.5  |
| 15 to 20                  | 5                 | 89                       | 84                           | 1310                 | 830  | 1264.2 | 877                        | 180 | 580.6 | 252                            | 135 | 201.2 | 14.0                        | 8.4 | 11.3 | 548                          | 392 | 482.4 | 32.2               | 26.1 | 28.7 | 45.9                      | 15.9      | 38.2  |
| 20 to 25                  | 1                 | 22                       | 21                           | 1281                 | 1281 | 1281.0 | 500                        | 500 | 500.0 | 190                            | 190 | 190.0 | 8.6                         | 8.6 | 8.6  | 591                          | 591 | 591.0 | 28.1               | 28.1 | 28.1 | 39.0                      | 14.8      | 46.1  |
| 25 to 30                  | 1                 | 26                       | 25                           | 1125                 | 1125 | 1125.0 | 200                        | 200 | 200.0 | 195                            | 195 | 195.0 | 7.5                         | 7.5 | 7.5  | 730                          | 730 | 730.0 | 29.2               | 29.2 | 29.2 | 17.8                      | 17.3      | 64.9  |
| 30 to 35                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 35 to 40                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |     |      |                              |     |       |                    |      |      |                           |           |       |
| 6.4                       | 252               | 1625                     | 1372                         | 1805                 | 162  | 550.9  | 918                        | 32  | 279.0 | 432                            | 20  | 110.0 | 50.5                        | 5.0 | 17.1 | 730                          | 22  | 162.0 | 46.0               | 16.8 | 29.7 | 50.6                      | 20.0      | 29.4  |

<sup>a</sup>Based on averages per flight.



TABLE III.- Continued

(c) Airplane type 3, light piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |        | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|--------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av     | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 2                 | 7                        | 5                            | 324                  | 206  | 265.0  | 108                        | 103 | 105.5  | 118                            | 39  | 78.5  | 29.5                        | 13.0 | 22.4 | 103                          | 59   | 81.0   | 34.3               | 29.5 | 32.4 | 39.8                      | 29.6      | 30.6  |
| 5 to 10                   | 16                | 112                      | 96                           | 2593                 | 345  | 870.8  | 2301                       | 116 | 481.1  | 376                            | 42  | 192.6 | 44.0                        | 8.4  | 27.5 | 297                          | 96   | 197.1  | 40.1               | 24.0 | 32.9 | 55.3                      | 22.1      | 22.6  |
| 10 to 15                  | 26                | 304                      | 278                          | 1420                 | 716  | 982.0  | 732                        | 100 | 314.9  | 396                            | 146 | 283.3 | 39.6                        | 10.4 | 24.2 | 546                          | 291  | 383.8  | 42.0               | 30.8 | 35.9 | 32.1                      | 28.8      | 39.1  |
| 15 to 20                  | 23                | 391                      | 367                          | 1402                 | 870  | 1104.1 | 647                        | 132 | 305.3  | 381                            | 146 | 252.8 | 23.7                        | 9.1  | 14.9 | 717                          | 399  | 546.0  | 42.2               | 26.6 | 34.2 | 27.7                      | 22.9      | 49.4  |
| 20 to 25                  | 18                | 390                      | 370                          | 2406                 | 898  | 1363.8 | 1163                       | 155 | 421.9  | 459                            | 125 | 289.7 | 21.8                        | 5.9  | 13.4 | 838                          | 491  | 652.2  | 30.1               | 23.4 | 31.7 | 30.9                      | 21.2      | 47.8  |
| 25 to 30                  | 2                 | 51                       | 49                           | 1791                 | 1584 | 1687.5 | 382                        | 336 | 359.8  | 539                            | 292 | 415.5 | 20.7                        | 11.7 | 16.3 | 956                          | 870  | 913.0  | 39.8               | 34.8 | 37.3 | 21.3                      | 24.6      | 54.1  |
| 30 to 35                  | 1                 | 30                       | 29                           | 1597                 | 1597 | 1597.0 | 411                        | 411 | 411.0  | 306                            | 306 | 306.0 | 10.2                        | 10.2 | 10.2 | 880                          | 880  | 880.0  | 30.3               | 30.3 | 30.3 | 25.7                      | 19.2      | 55.1  |
| 35 to 40                  | 3                 | 109                      | 106                          | 3307                 | 2405 | 2764.3 | 1512                       | 944 | 1106.7 | 594                            | 339 | 498.0 | 16.9                        | 9.4  | 13.7 | 1201                         | 1122 | 1159.7 | 35.3               | 31.2 | 32.8 | 40.0                      | 18.0      | 42.0  |
| 40 to 45                  | 1                 | 52                       | 51                           | 2325                 | 2325 | 2325.0 | 462                        | 462 | 462.0  | 382                            | 382 | 382.0 | 7.3                         | 7.3  | 7.3  | 1481                         | 1481 | 1481.0 | 29.0               | 29.0 | 29.0 | 19.9                      | 16.4      | 63.7  |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 15.7                      | 92                | 1446                     | 1351                         | 3307                 | 206  | 1147.0 | 2301                       | 100 | 387.2  | 594                            | 39  | 267.9 | 44.0                        | 5.9  | 17.0 | 1481                         | 59   | 491.9  | 42.2               | 23.4 | 33.5 | 33.8                      | 23.4      | 42.9  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(d) Airplane type 4a, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 3                 | 9                        | 6                            | 1173                 | 191  | 534.7  | 983                        | 120 | 412.0 | 50                             | 20  | 39.0  | 15.7                        | 10.0 | 13.0 | 140                          | 38   | 83.7   | 46.6               | 36.5 | 41.8 | 77.1                      | 7.3       | 15.7  |
| 5 to 10                   | 1                 | 7                        | 6                            | 813                  | 813  | 813.0  | 473                        | 473 | 473.0 | 104                            | 104 | 104.0 | 14.9                        | 14.9 | 14.9 | 236                          | 236  | 236.0  | 39.3               | 39.3 | 39.3 | 58.2                      | 12.8      | 29.0  |
| 10 to 15                  | 10                | 121                      | 111                          | 960                  | 693  | 850.6  | 314                        | 135 | 215.5 | 276                            | 124 | 185.2 | 27.6                        | 8.9  | 15.3 | 529                          | 348  | 449.9  | 48.1               | 37.0 | 40.5 | 25.3                      | 21.8      | 52.9  |
| 15 to 20                  | 22                | 380                      | 358                          | 1530                 | 750  | 1109.0 | 708                        | 120 | 247.9 | 315                            | 126 | 224.9 | 18.5                        | 7.0  | 13.0 | 899                          | 443  | 636.2  | 49.9               | 29.5 | 39.1 | 22.4                      | 20.3      | 57.4  |
| 20 to 25                  | 6                 | 129                      | 123                          | 1434                 | 1122 | 1299.8 | 554                        | 124 | 259.8 | 332                            | 134 | 259.0 | 15.8                        | 6.4  | 12.0 | 877                          | 722  | 779.2  | 39.9               | 34.4 | 38.1 | 20.0                      | 19.9      | 60.1  |
| 25 to 30                  | 5                 | 130                      | 125                          | 1887                 | 1394 | 1585.8 | 488                        | 138 | 257.2 | 294                            | 205 | 251.2 | 11.8                        | 7.6  | 9.7  | 1165                         | 1019 | 1077.4 | 44.8               | 40.8 | 43.1 | 16.2                      | 15.8      | 67.9  |
| 30 to 35                  | 3                 | 95                       | 92                           | 1927                 | 1277 | 1667.0 | 407                        | 208 | 279.3 | 287                            | 214 | 242.0 | 9.0                         | 6.9  | 7.6  | 1349                         | 855  | 1145.7 | 43.5               | 28.5 | 37.4 | 16.8                      | 14.5      | 68.7  |
| 35 to 40                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 90 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 17.4                      | 50                | 871                      | 821                          | 1927                 | 191  | 1121.0 | 983                        | 120 | 260.0 | 332                            | 20  | 211.1 | 27.6                        | 6.4  | 12.1 | 1349                         | 38   | 649.9  | 49.9               | 28.5 | 39.6 | 23.2                      | 18.8      | 58.0  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(e) Airplane type 4b, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |     |       | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|-----|-------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min | Av    | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 1                 | 2                        | 1                            | 265                  | 265  | 265.0  | 211                        | 211 | 211.0 | 28                             | 28  | 28.0  | 14.0                        | 14.0    | 14.0 | 26                           | 26  | 26.0  | 26.0               | 26.0    | 26.0 | 79.6                      | 10.6      | 9.8   |
| 5 to 10                   | 2                 | 14                       | 12                           | 1302                 | 450  | 876.0  | 820                        | 252 | 536.0 | 232                            | 49  | 140.5 | 29.0                        | 8.2     | 20.1 | 250                          | 149 | 199.5 | 35.7               | 29.8    | 33.2 | 61.2                      | 16.0      | 22.8  |
| 10 to 15                  | 10                | 126                      | 116                          | 1140                 | 774  | 886.4  | 617                        | 189 | 275.0 | 307                            | 144 | 239.7 | 25.6                        | 11.1    | 19.0 | 451                          | 262 | 371.7 | 38.4               | 20.2    | 32.0 | 31.0                      | 27.0      | 41.9  |
| 15 to 20                  | 22                | 375                      | 353                          | 1752                 | 794  | 1127.8 | 925                        | 80  | 332.5 | 312                            | 196 | 258.0 | 18.4                        | 10.9    | 15.1 | 671                          | 336 | 537.2 | 40.2               | 24.0    | 33.5 | 29.5                      | 22.9      | 47.6  |
| 20 to 25                  | 6                 | 135                      | 127                          | 1995                 | 1058 | 1313.8 | 914                        | 105 | 296.5 | 370                            | 266 | 318.0 | 15.4                        | 12.5    | 14.1 | 791                          | 618 | 699.3 | 35.4               | 30.9    | 33.0 | 22.6                      | 24.2      | 53.2  |
| 25 to 30                  | 5                 | 133                      | 128                          | 1531                 | 1175 | 1430.6 | 630                        | 91  | 368.2 | 395                            | 227 | 292.2 | 13.7                        | 8.4     | 11.0 | 930                          | 665 | 770.2 | 33.2               | 26.6    | 30.1 | 25.7                      | 20.4      | 53.8  |
| 30 to 35                  | 3                 | 93                       | 90                           | 1592                 | 1239 | 1428.3 | 286                        | 144 | 218.0 | 297                            | 246 | 279.0 | 9.8                         | 8.2     | 9.0  | 1071                         | 659 | 931.3 | 36.7               | 22.7    | 31.0 | 15.3                      | 19.5      | 65.2  |
| 35 to 40                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 17.9                      | 49                | 878                      | 827                          | 1995                 | 265  | 1122.7 | 925                        | 80  | 318.8 | 395                            | 28  | 256.9 | 29.0                        | 8.2     | 14.3 | 1071                         | 26  | 547.0 | 40.2               | 20.2    | 32.4 | 28.4                      | 22.9      | 48.7  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(f) Aircraft type 4ab, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |     |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|-----|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 4                 | 11                       | 7                            | 1173                 | 191  | 467.3  | 983                        | 120 | 361.8 | 50                             | 20  | 36.3  | 15.7                        | 10.0 | 13.1 | 140                          | 26  | 69.3   | 46.6               | 26.0 | 39.6 | 77.4                      | 7.8       | 14.8  |
| 5 to 10                   | 3                 | 21                       | 18                           | 1302                 | 450  | 855.0  | 820                        | 252 | 515.0 | 232                            | 49  | 128.3 | 29.0                        | 8.2  | 18.3 | 250                          | 149 | 211.7  | 39.3               | 29.8 | 35.3 | 60.2                      | 15.0      | 24.8  |
| 10 to 15                  | 20                | 247                      | 227                          | 1140                 | 693  | 868.5  | 617                        | 135 | 245.3 | 307                            | 124 | 212.5 | 27.6                        | 8.9  | 17.2 | 529                          | 262 | 410.8  | 48.1               | 20.2 | 36.2 | 28.3                      | 24.5      | 47.3  |
| 15 to 20                  | 44                | 755                      | 711                          | 1752                 | 750  | 1118.4 | 925                        | 80  | 290.2 | 315                            | 126 | 241.5 | 18.5                        | 7.0  | 14.1 | 899                          | 336 | 586.7  | 49.9               | 24.0 | 36.3 | 25.9                      | 21.6      | 52.5  |
| 20 to 25                  | 12                | 264                      | 250                          | 1995                 | 1058 | 1302.3 | 914                        | 105 | 278.2 | 370                            | 134 | 288.5 | 15.8                        | 6.4  | 13.1 | 877                          | 618 | 740.2  | 39.9               | 30.9 | 35.5 | 21.3                      | 22.1      | 56.6  |
| 25 to 30                  | 10                | 263                      | 253                          | 1887                 | 1175 | 1508.2 | 630                        | 91  | 312.7 | 395                            | 227 | 271.7 | 13.7                        | 7.6  | 10.3 | 1165                         | 665 | 875.1  | 44.8               | 26.6 | 36.6 | 20.7                      | 18.0      | 61.3  |
| 30 to 35                  | 6                 | 188                      | 182                          | 1927                 | 1239 | 1547.7 | 407                        | 144 | 248.7 | 297                            | 214 | 227.2 | 9.8                         | 6.9  | 7.3  | 1349                         | 659 | 1038.5 | 43.5               | 22.7 | 34.2 | 16.1                      | 16.8      | 67.1  |
| 35 to 40                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |        |                    |      |      |                           |           |       |
| 17.7                      | 99                | 1749                     | 1648                         | 1995                 | 191  | 1121.8 | 983                        | 80  | 289.1 | 395                            | 20  | 233.8 | 29.0                        | 6.4  | 13.2 | 1349                         | 26  | 598.9  | 49.9               | 20.2 | 36.0 | 25.8                      | 20.8      | 53.4  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(g) Airplane type 5a, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |     |       | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |     |       | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|-----|-------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|-----|-------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min | Av    | Max                        | Min | Av    | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min | Av    | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 14                | 44                       | 30                           | 540                  | 214 | 336.4 | 402                        | 90  | 199.6 | 92                             | 48  | 69.4  | 29.3                        | 16.0    | 29.3 | 113                          | 34  | 67.4  | 37.6               | 20.0    | 31.5 | 59.3                      | 20.6      | 20.0  |
| 5 to 10                   | 8                 | 54                       | 46                           | 740                  | 368 | 496.4 | 425                        | 168 | 228.0 | 137                            | 87  | 108.0 | 20.5                        | 11.0    | 20.5 | 248                          | 102 | 160.4 | 31.0               | 20.4    | 27.9 | 45.9                      | 21.8      | 32.3  |
| 10 to 15                  | 1                 | 14                       | 13                           | 643                  | 643 | 643.0 | 176                        | 176 | 176.0 | 124                            | 124 | 124.0 | 8.9                         | 8.9     | 8.9  | 343                          | 343 | 343.0 | 26.4               | 26.4    | 26.4 | 27.4                      | 19.3      | 53.3  |
| 15 to 20                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 20 to 25                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 25 to 30                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 30 to 35                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 35 to 40                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 40 to 45                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 4.9                       | 23                | 112                      | 89                           | 740                  | 214 | 405.3 | 425                        | 90  | 208.4 | 137                            | 48  | 85.2  | 29.3                        | 8.9     | 17.5 | 343                          | 34  | 111.7 | 37.6               | 26.4    | 28.9 | 51.4                      | 21.0      | 27.6  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(h) Airplane type 5b, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |      |        | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |      |        | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|------|--------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|------|--------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min  | Av     | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min  | Av     | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 26                | 104                      | 78                           | 408                  | 312  | 352.1  | 165                        | 93   | 135.5  | 145                            | 116 | 128.0 | 36.3                        | 29.0    | 32.0 | 112                          | 74   | 88.5   | 37.3               | 24.6    | 29.5 | 38.5                      | 36.4      | 25.1  |
| 5 to 10                   | 37                | 229                      | 192                          | 564                  | 285  | 376.9  | 211                        | 72   | 124.0  | 204                            | 60  | 111.4 | 34.0                        | 11.2    | 18.5 | 216                          | 94   | 141.5  | 31.5               | 18.8    | 27.3 | 32.9                      | 29.5      | 37.6  |
| 10 to 15                  | 24                | 280                      | 256                          | 1308                 | 425  | 740.1  | 751                        | 95   | 228.6  | 479                            | 71  | 214.8 | 34.2                        | 7.1     | 18.4 | 446                          | 195  | 296.7  | 35.0               | 19.5    | 27.8 | 30.9                      | 29.0      | 40.1  |
| 15 to 20                  | 9                 | 150                      | 141                          | 1821                 | 759  | 1176.7 | 821                        | 164  | 419.7  | 550                            | 134 | 286.8 | 28.9                        | 7.9     | 17.2 | 664                          | 354  | 470.2  | 38.9               | 22.1    | 30.0 | 35.7                      | 24.4      | 40.0  |
| 20 to 25                  | 5                 | 109                      | 104                          | 2038                 | 1122 | 1665.0 | 902                        | 255  | 491.2  | 838                            | 230 | 486.0 | 41.9                        | 11.5    | 22.3 | 778                          | 488  | 687.8  | 40.9               | 25.7    | 33.1 | 29.5                      | 29.2      | 41.3  |
| 25 to 30                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 30 to 35                  | 1                 | 34                       | 33                           | 1232                 | 1232 | 1232   | 121                        | 121  | 121.0  | 255                            | 255 | 255.0 | 7.5                         | 7.5     | 7.5  | 856                          | 856  | 856.0  | 25.9               | 25.9    | 25.9 | 9.8                       | 20.7      | 69.5  |
| 35 to 40                  | 1                 | 35                       | 34                           | 3207                 | 3207 | 3207   | 1611                       | 1611 | 1611.0 | 448                            | 448 | 448.0 | 12.8                        | 12.8    | 12.8 | 1148                         | 1148 | 1148.0 | 33.8               | 33.8    | 33.8 | 50.2                      | 14.0      | 35.8  |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 9.1                       | 103               | 941                      | 838                          | 3207                 | 285  | 623.5  | 1611                       | 72   | 209.3  | 838                            | 60  | 177.9 | 41.9                        | 7.1     | 19.5 | 1148                         | 74   | 236.3  | 40.9               | 18.8    | 29.0 | 33.6                      | 28.5      | 37.9  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(i) Airplane type 5ab, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |      |        | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|------|--------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min  | Av     | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 40                | 148                      | 108                          | 540                  | 214  | 346.6  | 402                        | 90   | 158.0  | 145                            | 48  | 107.5 | 36.3                        | 16.0 | 29.1 | 113                          | 34   | 81.2   | 37.6               | 20.0 | 30.1 | 45.6                      | 31.0      | 23.4  |
| 5 to 10                   | 45                | 283                      | 238                          | 740                  | 285  | 398.1  | 425                        | 72   | 142.5  | 204                            | 60  | 110.8 | 34.0                        | 11.0 | 17.6 | 248                          | 94   | 144.9  | 31.5               | 18.8 | 27.4 | 35.8                      | 27.8      | 36.4  |
| 10 to 15                  | 25                | 294                      | 269                          | 1308                 | 425  | 736.2  | 751                        | 95   | 226.5  | 479                            | 71  | 211.2 | 34.2                        | 7.1  | 18.0 | 446                          | 195  | 298.6  | 35.0               | 19.5 | 27.7 | 30.8                      | 28.7      | 40.6  |
| 15 to 20                  | 9                 | 150                      | 141                          | 1821                 | 759  | 1176.7 | 821                        | 164  | 419.7  | 550                            | 134 | 286.8 | 28.9                        | 7.9  | 17.2 | 664                          | 354  | 470.6  | 38.9               | 22.1 | 30.0 | 35.7                      | 24.4      | 40.0  |
| 20 to 25                  | 5                 | 109                      | 104                          | 2038                 | 1122 | 1665.0 | 902                        | 255  | 491.2  | 838                            | 230 | 486.0 | 41.9                        | 11.5 | 22.3 | 778                          | 488  | 687.8  | 40.9               | 25.7 | 33.1 | 29.5                      | 29.2      | 41.3  |
| 25 to 30                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 30 to 35                  | 1                 | 34                       | 33                           | 1232                 | 1232 | 1232   | 121                        | 121  | 121.0  | 255                            | 255 | 255.0 | 7.5                         | 7.5  | 7.5  | 856                          | 856  | 856.0  | 25.9               | 25.9 | 25.9 | 9.8                       | 20.7      | 69.5  |
| 35 to 40                  | 1                 | 35                       | 34                           | 3207                 | 3207 | 3207   | 1611                       | 1611 | 1611.0 | 448                            | 448 | 448.0 | 12.8                        | 12.8 | 12.8 | 1148                         | 1148 | 1148.0 | 33.8               | 33.8 | 33.8 | 50.2                      | 14.0      | 35.8  |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 8.4                       | 126               | 1053                     | 927                          | 3207                 | 214  | 583.6  | 1611                       | 72   | 209.2  | 838                            | 48  | 160.9 | 41.9                        | 7.1  | 19.3 | 1148                         | 34   | 213.5  | 40.9               | 18.8 | 29.0 | 35.8                      | 27.6      | 36.6  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(j) Airplane type 6a, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |      |        | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|------|--------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min  | Av     | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 1                 | 4                        | 3                            | 324                  | 324  | 324.0  | 192                        | 192 | 192.0 | 18                             | 18  | 18.0  | 4.5                         | 4.5     | 4.5  | 114                          | 114  | 114.0  | 38.0               | 38.0    | 38.0 | 59.3                      | 5.6       | 35.2  |
| 5 to 10                   | 27                | 204                      | 177                          | 821                  | 321  | 555.4  | 391                        | 67  | 191.7 | 360                            | 45  | 177.6 | 40.0                        | 5.6     | 23.5 | 270                          | 109  | 186.1  | 35.0               | 17.6    | 28.4 | 34.5                      | 32.0      | 33.5  |
| 10 to 15                  | 55                | 643                      | 588                          | 927                  | 463  | 705.3  | 429                        | 80  | 181.1 | 374                            | 88  | 223.2 | 37.4                        | 7.8     | 19.1 | 435                          | 178  | 300.9  | 39.9               | 19.8    | 28.1 | 25.7                      | 31.6      | 42.7  |
| 15 to 20                  | 28                | 466                      | 437                          | 1780                 | 570  | 863.7  | 893                        | 49  | 189.1 | 461                            | 147 | 266.2 | 30.7                        | 8.6     | 16.0 | 549                          | 274  | 408.5  | 38.2               | 18.8    | 26.2 | 21.9                      | 30.8      | 47.3  |
| 20 to 25                  | 19                | 421                      | 402                          | 1391                 | 748  | 1040.8 | 288                        | 58  | 186.0 | 499                            | 138 | 310.4 | 23.8                        | 6.6     | 14.0 | 681                          | 301  | 544.4  | 30.3               | 15.8    | 25.7 | 17.9                      | 29.8      | 52.3  |
| 25 to 30                  | 11                | 291                      | 280                          | 1574                 | 1064 | 1208.6 | 481                        | 88  | 253.4 | 312                            | 198 | 266.7 | 12.3                        | 7.9     | 10.1 | 835                          | 525  | 688.5  | 32.1               | 21.0    | 27.1 | 21.0                      | 22.1      | 57.0  |
| 30 to 35                  | 6                 | 193                      | 186                          | 2359                 | 1050 | 1476.2 | 974                        | 88  | 319.8 | 470                            | 255 | 377.2 | 15.7                        | 7.7     | 11.7 | 1018                         | 587  | 779.2  | 31.8               | 19.6    | 25.1 | 21.7                      | 25.6      | 52.8  |
| 35 to 40                  | 2                 | 72                       | 69                           | 1890                 | 1590 | 1740.0 | 544                        | 184 | 364.0 | 504                            | 420 | 462.0 | 14.4                        | 11.7    | 12.8 | 986                          | 842  | 914.0  | 28.2               | 24.8    | 26.5 | 20.9                      | 26.6      | 52.5  |
| 40 to 45                  | 1                 | 44                       | 43                           | 1638                 | 1638 | 1638.0 | 246                        | 246 | 246.0 | 390                            | 390 | 390.0 | 8.9                         | 8.9     | 8.9  | 1002                         | 1002 | 1002.0 | 23.3               | 23.3    | 23.3 | 15.0                      | 23.8      | 61.2  |
| 45 to 50                  | 1                 | 57                       | 56                           | 2241                 | 2241 | 2241.0 | 360                        | 360 | 360.0 | 495                            | 495 | 495.0 | 8.7                         | 8.7     | 8.7  | 1386                         | 1386 | 1386.0 | 24.8               | 24.8    | 24.8 | 16.1                      | 22.1      | 61.8  |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 15.9                      | 151               | 2395                     | 2241                         | 2359                 | 321  | 844.9  | 974                        | 49  | 200.0 | 504                            | 18  | 248.0 | 40.0                        | 4.5     | 15.6 | 1386                         | 109  | 396.9  | 39.9               | 15.8    | 26.7 | 23.7                      | 29.4      | 47.0  |

<sup>a</sup>Based on averages per flight.



TABLE III.- Continued

(k) Airplane type 6b, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |     |       | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |     |       | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|-----|-------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|-----|-------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min | Av    | Max                        | Min | Av    | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min | Av    | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 5 to 10                   | 30                | 211                      | 181                          | 884                  | 511 | 640.3 | 536                        | 228 | 319.7 | 222                            | 121 | 175.2 | 34.3                        | 16.8    | 24.9 | 218                          | 94  | 145.4 | 27.5               | 18.0    | 24.1 | 49.9                      | 27.4      | 22.7  |
| 10 to 15                  | 88                | 1046                     | 957                          | 1262                 | 527 | 712.8 | 755                        | 119 | 302.0 | 208                            | 110 | 163.8 | 20.8                        | 9.9     | 13.8 | 356                          | 184 | 247.0 | 29.6               | 17.7    | 22.7 | 42.4                      | 23.0      | 34.7  |
| 15 to 20                  | 13                | 206                      | 193                          | 1638                 | 704 | 945.4 | 940                        | 151 | 379.5 | 253                            | 171 | 216.1 | 16.9                        | 10.8    | 13.6 | 485                          | 277 | 349.8 | 32.2               | 18.5    | 23.6 | 40.1                      | 22.9      | 37.0  |
| 20 to 25                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 25 to 30                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 30 to 35                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 35 to 40                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 40 to 45                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |     |       |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 11.2                      | 131               | 1463                     | 1331                         | 1638                 | 511 | 719.3 | 940                        | 119 | 313.8 | 253                            | 110 | 171.6 | 34.3                        | 9.9     | 15.4 | 485                          | 94  | 234.0 | 32.2               | 17.7    | 23.0 | 43.6                      | 23.9      | 32.5  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(1) Airplane type 6ab, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |      |        | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|------|--------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min  | Av     | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 1                 | 4                        | 3                            | 324                  | 324  | 324.0  | 192                        | 192 | 192.0 | 18                             | 18  | 18.0  | 4.5                         | 4.5     | 4.5  | 114                          | 114  | 114.0  | 38.0               | 38.0    | 38.0 | 59.3                      | 5.6       | 35.2  |
| 5 to 10                   | 57                | 415                      | 358                          | 884                  | 321  | 600.1  | 536                        | 67  | 259.1 | 360                            | 45  | 176.4 | 40.0                        | 5.6     | 24.2 | 270                          | 94   | 164.7  | 35.0               | 17.6    | 26.2 | 43.2                      | 29.4      | 27.4  |
| 10 to 15                  | 143               | 1689                     | 1545                         | 1262                 | 463  | 709.9  | 755                        | 80  | 255.1 | 374                            | 88  | 186.6 | 37.4                        | 7.8     | 15.8 | 435                          | 178  | 267.8  | 39.9               | 17.7    | 24.8 | 36.0                      | 26.3      | 37.7  |
| 15 to 20                  | 41                | 672                      | 630                          | 1780                 | 570  | 889.6  | 940                        | 49  | 249.4 | 461                            | 147 | 250.3 | 30.7                        | 8.6     | 15.3 | 549                          | 274  | 391.4  | 38.2               | 18.5    | 25.4 | 28.0                      | 28.1      | 43.8  |
| 20 to 25                  | 19                | 421                      | 402                          | 1391                 | 748  | 1040.8 | 288                        | 58  | 186.0 | 499                            | 138 | 310.4 | 23.8                        | 6.6     | 14.0 | 681                          | 301  | 544.4  | 30.3               | 15.8    | 25.7 | 17.9                      | 29.8      | 52.3  |
| 25 to 30                  | 11                | 291                      | 280                          | 1574                 | 1064 | 1208.6 | 481                        | 88  | 253.4 | 312                            | 198 | 266.7 | 12.3                        | 7.9     | 10.1 | 835                          | 525  | 688.5  | 32.1               | 21.0    | 27.1 | 21.0                      | 22.1      | 57.0  |
| 30 to 35                  | 6                 | 193                      | 186                          | 2359                 | 1050 | 1476.2 | 974                        | 88  | 319.8 | 470                            | 255 | 377.2 | 15.7                        | 7.7     | 11.7 | 1018                         | 587  | 792.2  | 31.8               | 19.6    | 25.1 | 21.7                      | 25.6      | 52.8  |
| 35 to 40                  | 2                 | 72                       | 69                           | 1890                 | 1590 | 1740.0 | 544                        | 184 | 364.0 | 504                            | 420 | 462.0 | 14.4                        | 11.7    | 12.8 | 986                          | 842  | 914.0  | 28.2               | 24.8    | 26.5 | 20.9                      | 26.6      | 52.5  |
| 40 to 45                  | 1                 | 44                       | 43                           | 1638                 | 1638 | 1638.0 | 246                        | 246 | 246.0 | 390                            | 390 | 390.0 | 8.9                         | 8.9     | 8.9  | 1002                         | 1002 | 1002.0 | 23.3               | 23.3    | 23.3 | 15.0                      | 23.8      | 61.2  |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 55 to 60                  | 1                 | 57                       | 56                           | 2241                 | 2241 | 2241.0 | 360                        | 360 | 360.0 | 495                            | 495 | 495.0 | 8.7                         | 8.7     | 8.7  | 1386                         | 1386 | 1386.0 | 24.8               | 24.8    | 24.8 | 16.1                      | 22.1      | 61.8  |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 13.7                      | 282               | 3858                     | 3572                         | 2359                 | 321  | 786.6  | 974                        | 49  | 252.8 | 504                            | 18  | 212.5 | 40.0                        | 4.5     | 15.5 | 1386                         | 94   | 321.2  | 39.9               | 15.8    | 25.4 | 32.1                      | 27.0      | 40.8  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(m) Airplane type 7a, heavy turbine

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |     |       | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|-----|-------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min | Av    | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 26                | 91                       | 65                           | 336                  | 184  | 242.4  | 185                        | 56  | 108.7 | 100                            | 41  | 81.2  | 33.3                        | 10.3    | 23.2 | 80                           | 33  | 52.5  | 26.6               | 15.3    | 21.0 | 44.8                      | 33.5      | 21.7  |
| 5 to 10                   | 37                | 255                      | 218                          | 894                  | 219  | 421.1  | 567                        | 73  | 160.4 | 206                            | 53  | 129.6 | 28.0                        | 10.5    | 18.8 | 201                          | 68  | 131.1 | 34.8               | 16.8    | 22.2 | 38.1                      | 30.8      | 31.1  |
| 10 to 15                  | 24                | 276                      | 252                          | 972                  | 450  | 620.6  | 457                        | 93  | 162.3 | 324                            | 124 | 206.0 | 24.9                        | 10.3    | 17.9 | 346                          | 185 | 252.3 | 30.1               | 18.6    | 24.0 | 26.1                      | 33.2      | 40.7  |
| 15 to 20                  | 9                 | 150                      | 141                          | 1188                 | 630  | 852.7  | 475                        | 50  | 230.3 | 336                            | 195 | 249.2 | 19.7                        | 13.0    | 15.0 | 474                          | 332 | 373.1 | 27.9               | 21.8    | 23.8 | 27.0                      | 29.2      | 43.8  |
| 20 to 25                  | 5                 | 107                      | 102                          | 1202                 | 714  | 951.4  | 360                        | 96  | 187.6 | 628                            | 168 | 296.4 | 28.5                        | 8.4     | 13.9 | 540                          | 411 | 467.4 | 24.9               | 21.6    | 22.9 | 19.7                      | 31.2      | 49.1  |
| 25 to 30                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 30 to 35                  | 1                 | 32                       | 31                           | 1212                 | 1212 | 1212.0 | 133                        | 133 | 133.0 | 448                            | 448 | 448.0 | 14.0                        | 14.0    | 14.0 | 631                          | 631 | 631.0 | 20.4               | 20.4    | 20.4 | 11.0                      | 37.0      | 52.1  |
| 35 to 40                  | 1                 | 37                       | 36                           | 1350                 | 1350 | 1350.0 | 135                        | 135 | 135.0 | 568                            | 568 | 568.0 | 15.4                        | 15.4    | 15.4 | 647                          | 647 | 647.0 | 18.0               | 18.0    | 18.0 | 10.0                      | 42.1      | 47.9  |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |     |       |                    |         |      |                           |           |       |
| 9.2                       | 103               | 948                      | 845                          | 1350                 | 184  | 502.6  | 567                        | 50  | 154.7 | 628                            | 41  | 161.1 | 33.3                        | 8.4     | 17.5 | 647                          | 33  | 186.8 | 34.8               | 15.3    | 22.8 | 30.8                      | 32.0      | 37.2  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(n) Airplane type 7b, heavy turbine

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |     |       | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|-----|-------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min | Av    | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 26                | 100                      | 74                           | 450                  | 210  | 276.3  | 390                        | 64  | 124.3 | 121                            | 20  | 74.7  | 37.3                        | 6.7  | 19.4 | 101                          | 28  | 77.3  | 33.7               | 21.7 | 27.1 | 45.0                      | 27.0      | 28.0  |
| 5 to 10                   | 37                | 236                      | 198                          | 564                  | 246  | 380.5  | 282                        | 70  | 128.3 | 186                            | 52  | 118.0 | 27.0                        | 10.4 | 18.5 | 202                          | 88  | 134.2 | 34.0               | 19.4 | 25.1 | 33.7                      | 31.0      | 35.3  |
| 10 to 15                  | 24                | 276                      | 252                          | 1031                 | 396  | 600.2  | 616                        | 49  | 175.3 | 290                            | 89  | 168.0 | 26.4                        | 7.8  | 14.6 | 339                          | 187 | 256.8 | 30.0               | 20.0 | 24.5 | 29.2                      | 28.0      | 42.8  |
| 15 to 20                  | 9                 | 151                      | 142                          | 1266                 | 534  | 835.9  | 637                        | 67  | 207.4 | 382                            | 96  | 184.1 | 20.1                        | 6.0  | 11.0 | 520                          | 337 | 444.3 | 32.5               | 22.5 | 28.2 | 24.8                      | 22.0      | 53.1  |
| 20 to 25                  | 5                 | 105                      | 100                          | 1048                 | 819  | 927.0  | 135                        | 73  | 109.6 | 446                            | 165 | 322.8 | 22.3                        | 7.2  | 15.4 | 526                          | 443 | 494.6 | 26.1               | 23.3 | 24.7 | 11.8                      | 34.8      | 53.4  |
| 25 to 30                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 30 to 35                  | 1                 | 33                       | 32                           | 1035                 | 1035 | 1035.0 | 84                         | 84  | 84.0  | 227                            | 227 | 227.0 | 6.9                         | 6.9  | 6.9  | 724                          | 724 | 724.0 | 22.6               | 22.6 | 22.6 | 8.1                       | 21.9      | 70.0  |
| 35 to 40                  | 1                 | 37                       | 36                           | 1626                 | 1626 | 1626.0 | 246                        | 246 | 246.0 | 510                            | 510 | 510.0 | 13.8                        | 13.8 | 13.8 | 870                          | 870 | 870.0 | 24.2               | 24.2 | 24.2 | 15.1                      | 31.4      | 53.5  |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 9.1                       | 103               | 938                      | 834                          | 1626                 | 210  | 490.2  | 637                        | 49  | 145.0 | 510                            | 20  | 139.3 | 37.3                        | 6.0  | 15.3 | 870                          | 28  | 205.9 | 34.0               | 19.4 | 25.4 | 29.6                      | 28.4      | 42.0  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(c) Airplane type 7ab, heavy turbine

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |     |       | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|-----|-------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min | Av    | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 52                | 191                      | 139                          | 450                  | 184  | 259.4  | 390                        | 56  | 116.4 | 121                            | 20  | 78.0  | 37.3                        | 6.7  | 21.2 | 101                          | 28  | 64.9  | 33.7               | 15.3 | 24.3 | 44.9                      | 30.1      | 25.0  |
| 5 to 10                   | 74                | 491                      | 416                          | 894                  | 219  | 400.8  | 567                        | 70  | 144.4 | 206                            | 52  | 123.8 | 28.0                        | 10.4 | 18.7 | 201                          | 68  | 132.6 | 34.8               | 16.8 | 23.6 | 36.0                      | 30.9      | 33.1  |
| 10 to 15                  | 48                | 552                      | 504                          | 1031                 | 396  | 610.4  | 616                        | 49  | 168.8 | 324                            | 89  | 187.0 | 26.4                        | 7.8  | 16.3 | 346                          | 185 | 254.6 | 30.1               | 18.6 | 24.2 | 27.7                      | 30.6      | 41.7  |
| 15 to 20                  | 18                | 301                      | 283                          | 1266                 | 534  | 844.3  | 637                        | 50  | 218.9 | 382                            | 96  | 216.7 | 20.1                        | 6.0  | 13.0 | 520                          | 332 | 408.7 | 32.5               | 21.8 | 26.0 | 25.9                      | 25.7      | 48.4  |
| 20 to 25                  | 10                | 212                      | 202                          | 1202                 | 714  | 939.2  | 360                        | 73  | 148.6 | 628                            | 165 | 309.6 | 28.5                        | 7.2  | 14.6 | 540                          | 411 | 481.0 | 26.1               | 21.6 | 23.8 | 15.8                      | 33.0      | 51.2  |
| 25 to 30                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 30 to 35                  | 2                 | 65                       | 63                           | 1212                 | 1035 | 1057.5 | 133                        | 84  | 108.5 | 448                            | 227 | 248.5 | 14.0                        | 6.9  | 7.8  | 724                          | 631 | 677.5 | 22.6               | 20.4 | 21.5 | 8.8                       | 23.5      | 67.7  |
| 35 to 40                  | 2                 | 74                       | 72                           | 1626                 | 1350 | 1488.0 | 246                        | 135 | 190.5 | 568                            | 510 | 539.0 | 15.4                        | 13.8 | 14.6 | 870                          | 647 | 758.5 | 24.2               | 18.0 | 21.1 | 12.8                      | 36.2      | 51.0  |
| 40 to 45                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |     |       |                    |      |      |                           |           |       |
| 9.2                       | 206               | 1886                     | 1679                         | 1626                 | 184  | 496.4  | 637                        | 49  | 149.8 | 628                            | 20  | 150.2 | 37.3                        | 6.0  | 16.4 | 870                          | 28  | 196.4 | 34.8               | 15.3 | 24.1 | 30.2                      | 30.3      | 39.6  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(p) Airplane type 8a, heavy turbine

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 18                | 65                       | 47                           | 708                  | 264  | 348.3  | 398                        | 106 | 166.4 | 199                            | 42  | 111.4 | 49.8                        | 14.0 | 30.9 | 111                          | 48   | 70.4   | 37.0               | 16.0 | 27.0 | 47.8                      | 32.0      | 20.2  |
| 5 to 10                   | 20                | 117                      | 97                           | 576                  | 299  | 406.8  | 246                        | 93  | 157.7 | 174                            | 68  | 138.8 | 30.0                        | 13.6 | 23.7 | 170                          | 62   | 110.4  | 34.8               | 15.5 | 22.8 | 38.8                      | 34.1      | 27.1  |
| 10 to 15                  | 11                | 135                      | 124                          | 1353                 | 477  | 906.5  | 798                        | 180 | 431.7 | 441                            | 104 | 195.8 | 40.1                        | 7.6  | 16.0 | 423                          | 151  | 278.9  | 34.5               | 16.8 | 24.7 | 47.6                      | 21.6      | 30.8  |
| 15 to 20                  | 11                | 194                      | 183                          | 1380                 | 636  | 1030.5 | 568                        | 105 | 312.9 | 466                            | 167 | 354.7 | 27.3                        | 9.3  | 20.1 | 470                          | 261  | 362.8  | 26.1               | 16.3 | 21.8 | 30.4                      | 34.4      | 35.2  |
| 20 to 25                  | 8                 | 180                      | 171                          | 1580                 | 911  | 1185.8 | 578                        | 131 | 365.4 | 535                            | 143 | 331.3 | 22.3                        | 6.8  | 14.7 | 585                          | 408  | 489.1  | 25.6               | 20.4 | 22.9 | 30.8                      | 27.9      | 41.3  |
| 25 to 30                  | 11                | 297                      | 284                          | 1959                 | 912  | 1307.6 | 1142                       | 131 | 369.2 | 507                            | 243 | 369.0 | 17.4                        | 9.7  | 13.7 | 679                          | 489  | 569.5  | 27.2               | 16.9 | 22.1 | 28.2                      | 28.2      | 43.5  |
| 30 to 35                  | 8                 | 257                      | 249                          | 1953                 | 1094 | 1454.4 | 917                        | 149 | 362.9 | 567                            | 298 | 410.1 | 16.7                        | 8.8  | 12.8 | 839                          | 536  | 681.4  | 27.0               | 17.9 | 21.9 | 25.0                      | 28.2      | 46.9  |
| 35 to 40                  | 6                 | 224                      | 214                          | 2084                 | 1566 | 1703.7 | 816                        | 314 | 487.5 | 568                            | 359 | 453.7 | 15.4                        | 9.7  | 12.2 | 909                          | 596  | 762.5  | 25.3               | 17.0 | 21.4 | 28.6                      | 26.6      | 44.8  |
| 40 to 45                  | 2                 | 83                       | 81                           | 1775                 | 1321 | 1548.0 | 414                        | 261 | 337.5 | 401                            | 268 | 334.5 | 9.3                         | 6.7  | 8.1  | 960                          | 792  | 876.0  | 22.9               | 20.3 | 21.6 | 21.8                      | 21.6      | 56.6  |
| 45 to 50                  | 3                 | 140                      | 137                          | 1787                 | 1613 | 1700.3 | 392                        | 90  | 252.3 | 546                            | 342 | 444.3 | 12.1                        | 7.1  | 9.4  | 1084                         | 849  | 1003.7 | 23.4               | 19.3 | 22.0 | 14.8                      | 26.1      | 59.0  |
| 50 to 55                  | 2                 | 107                      | 105                          | 2376                 | 2099 | 2237.5 | 520                        | 316 | 418.0 | 575                            | 385 | 480.0 | 10.8                        | 7.1  | 9.0  | 1471                         | 1208 | 1339.5 | 27.8               | 23.2 | 25.5 | 18.7                      | 21.5      | 59.9  |
| 55 to 60                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 90 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 18.0                      | 100               | 1799                     | 1692                         | 2376                 | 264  | 941.1  | 1142                       | 90  | 294.2 | 568                            | 42  | 265.1 | 49.8                        | 6.7  | 14.7 | 1471                         | 48   | 381.8  | 37.0               | 15.5 | 22.6 | 31.3                      | 28.2      | 40.6  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Continued

(q) Airplane type 8b, heavy turbine

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |      |        | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|------|--------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min  | Av     | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 5 to 10                   |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 10 to 15                  | 1                 | 13                       | 12                           | 1882                 | 1882 | 1882.0 | 1276                       | 1276 | 1276.0 | 243                            | 243 | 243.0 | 18.7                        | 18.7 | 18.7 | 363                          | 363  | 363.0  | 30.3               | 30.3 | 30.3 | 67.8                      | 12.9      | 19.3  |
| 15 to 20                  | 11                | 188                      | 177                          | 2761                 | 919  | 2006.2 | 1936                       | 160  | 1140.0 | 763                            | 190 | 408.3 | 42.4                        | 10.0 | 23.9 | 554                          | 388  | 457.8  | 32.5               | 26.4 | 28.5 | 56.8                      | 20.4      | 22.8  |
| 20 to 25                  | 8                 | 179                      | 171                          | 2454                 | 1298 | 2022.3 | 1382                       | 372  | 1022.1 | 583                            | 122 | 409.9 | 27.8                        | 5.3  | 18.3 | 675                          | 441  | 490.3  | 31.7               | 21.0 | 27.6 | 50.5                      | 20.3      | 29.2  |
| 25 to 30                  | 11                | 290                      | 278                          | 6059                 | 1959 | 2756.4 | 4817                       | 956  | 1549.4 | 625                            | 253 | 443.2 | 25.0                        | 8.7  | 16.8 | 1252                         | 541  | 763.8  | 52.2               | 22.5 | 30.2 | 56.2                      | 16.1      | 27.7  |
| 30 to 35                  | 8                 | 250                      | 240                          | 3234                 | 1567 | 2332.3 | 1958                       | 568  | 1128.3 | 710                            | 200 | 207.6 | 22.9                        | 6.7  | 13.0 | 956                          | 660  | 796.4  | 31.7               | 22.0 | 26.5 | 48.4                      | 17.5      | 34.1  |
| 35 to 40                  | 6                 | 222                      | 216                          | 4384                 | 1446 | 2784.0 | 2791                       | 251  | 1315.7 | 911                            | 300 | 509.5 | 25.3                        | 7.9  | 13.8 | 1121                         | 817  | 958.8  | 31.1               | 24.0 | 26.6 | 47.3                      | 18.3      | 34.4  |
| 40 to 45                  | 2                 | 83                       | 81                           | 3133                 | 2863 | 2998.0 | 1381                       | 1182 | 1281.5 | 821                            | 681 | 751.0 | 19.1                        | 17.0 | 18.1 | 1000                         | 931  | 965.5  | 25.6               | 22.2 | 23.8 | 42.7                      | 25.1      | 32.2  |
| 45 to 50                  | 3                 | 139                      | 136                          | 2961                 | 2803 | 2885.3 | 1038                       | 939  | 976.7  | 1029                           | 647 | 866.0 | 22.9                        | 14.4 | 18.7 | 1276                         | 910  | 1042.7 | 29.0               | 19.6 | 23.0 | 33.8                      | 30.0      | 36.1  |
| 50 to 55                  | 1                 | 54                       | 53                           | 3290                 | 3290 | 3290.0 | 1351                       | 1351 | 1351.0 | 470                            | 470 | 470.0 | 8.7                         | 8.7  | 8.7  | 1469                         | 1469 | 1469.0 | 27.7               | 27.7 | 27.7 | 41.1                      | 14.3      | 44.7  |
| 55 to 60                  | 1                 | 55                       | 54                           | 3146                 | 3146 | 3146.0 | 960                        | 960  | 960.0  | 644                            | 644 | 644.0 | 11.7                        | 11.7 | 11.7 | 1542                         | 1542 | 1542.0 | 28.6               | 28.6 | 28.6 | 30.5                      | 20.5      | 49.0  |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |      |        |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 28.3                      | 52                | 1473                     | 1418                         | 6059                 | 919  | 2440.3 | 4817                       | 160  | 1226.2 | 1029                           | 122 | 469.6 | 42.4                        | 5.3  | 16.6 | 1542                         | 363  | 744.6  | 52.2               | 19.6 | 27.3 | 50.2                      | 19.2      | 30.5  |

<sup>a</sup>Based on averages per flight.

TABLE III.- Concluded

(r) Airplane type 8ab, heavy turbine

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |         |      | Turning time per flight, sec |      |        | Time per turn, sec |         |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|---------|------|------------------------------|------|--------|--------------------|---------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max (a)                     | Min (a) | Av   | Max                          | Min  | Av     | Max (a)            | Min (a) | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 18                | 65                       | 47                           | 708                  | 264  | 348.3  | 398                        | 106 | 166.4 | 199                            | 42  | 111.4 | 49.8                        | 14.0    | 30.9 | 111                          | 48   | 70.4   | 37.0               | 16.0    | 27.0 | 47.8                      | 32.0      | 20.2  |
| 5 to 10                   | 20                | 117                      | 97                           | 576                  | 299  | 406.8  | 246                        | 93  | 157.7 | 174                            | 68  | 138.8 | 30.0                        | 13.6    | 23.7 | 170                          | 62   | 110.4  | 34.8               | 15.5    | 22.8 | 38.8                      | 34.1      | 27.1  |
| 10 to 15                  | 12                | 148                      | 136                          | 1882                 | 477  | 987.8  | 1276                       | 180 | 502.1 | 441                            | 104 | 199.8 | 40.1                        | 7.6     | 16.2 | 423                          | 151  | 285.9  | 34.5               | 16.8    | 25.2 | 50.8                      | 20.2      | 28.9  |
| 15 to 20                  | 22                | 382                      | 360                          | 2761                 | 636  | 1518.4 | 1936                       | 105 | 726.5 | 763                            | 167 | 381.5 | 42.4                        | 9.3     | 22.0 | 554                          | 261  | 410.3  | 32.5               | 16.3    | 25.1 | 47.8                      | 25.1      | 27.0  |
| 20 to 25                  | 16                | 359                      | 342                          | 2454                 | 911  | 1604.0 | 1382                       | 131 | 693.8 | 583                            | 122 | 370.6 | 27.8                        | 5.3     | 16.5 | 675                          | 408  | 539.7  | 31.7               | 20.4    | 25.2 | 43.3                      | 23.1      | 33.6  |
| 25 to 30                  | 22                | 587                      | 562                          | 6059                 | 912  | 2032.0 | 4817                       | 131 | 959.3 | 625                            | 243 | 406.1 | 25.0                        | 8.7     | 15.2 | 1252                         | 489  | 666.6  | 52.2               | 16.9    | 26.1 | 47.2                      | 20.0      | 32.8  |
| 30 to 35                  | 16                | 507                      | 489                          | 3234                 | 1094 | 1893.3 | 1958                       | 149 | 745.6 | 710                            | 200 | 408.9 | 22.9                        | 6.7     | 12.9 | 956                          | 536  | 738.9  | 31.7               | 17.9    | 24.2 | 39.4                      | 21.6      | 39.0  |
| 35 to 40                  | 12                | 446                      | 430                          | 4384                 | 1446 | 2243.8 | 2791                       | 251 | 901.6 | 911                            | 300 | 481.6 | 25.3                        | 7.9     | 13.0 | 1121                         | 596  | 860.7  | 31.1               | 17.0    | 24.0 | 40.2                      | 21.5      | 38.4  |
| 40 to 45                  | 4                 | 166                      | 162                          | 3133                 | 1321 | 2273.0 | 1381                       | 261 | 809.5 | 821                            | 268 | 542.8 | 19.1                        | 6.7     | 13.1 | 1000                         | 792  | 920.8  | 25.6               | 20.3    | 22.7 | 35.6                      | 23.9      | 40.5  |
| 45 to 50                  | 6                 | 279                      | 273                          | 2961                 | 1613 | 2292.8 | 1038                       | 90  | 614.5 | 1029                           | 342 | 655.2 | 22.9                        | 7.1     | 14.1 | 1276                         | 849  | 1023.2 | 29.0               | 19.3    | 22.5 | 26.8                      | 28.6      | 44.6  |
| 50 to 55                  | 3                 | 161                      | 158                          | 3290                 | 2099 | 2588.3 | 1351                       | 316 | 729.0 | 575                            | 385 | 476.7 | 10.8                        | 7.1     | 8.9  | 1471                         | 1208 | 1382.7 | 27.8               | 23.2    | 26.3 | 28.2                      | 18.4      | 53.4  |
| 55 to 60                  | 1                 | 55                       | 54                           | 3146                 | 3146 | 3146.0 | 960                        | 960 | 960.0 | 644                            | 644 | 644.0 | 11.7                        | 11.7    | 11.7 | 1542                         | 1542 | 1542.0 | 28.6               | 28.6    | 28.6 | 30.5                      | 20.5      | 49.0  |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |         |      |                              |      |        |                    |         |      |                           |           |       |
| 21.5                      | 152               | 3272                     | 3110                         | 6059                 | 264  | 1454.0 | 4817                       | 90  | 613.0 | 1029                           | 42  | 335.1 | 49.8                        | 5.3     | 15.6 | 1542                         | 48   | 505.9  | 52.2               | 15.5    | 24.7 | 42.2                      | 23.0      | 34.8  |

<sup>a</sup>Based on averages per flight.



TABLE IV.- SUMMARY OF OPERATIONAL DATA FROM THREE CLASSES OF AGRICULTURAL AIRPLANES

(a) Class A, light piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |        | Spreading time per flight, sec |      |        | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|--------|--------------------------------|------|--------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av     | Max                            | Min  | Av     | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 106               | 379                      | 273                          | 708                  | 162  | 363.0  | 586                        | 32  | 216.8  | 202                            | 20   | 73.9   | 50.5                        | 6.7  | 20.7 | 113                          | 22   | 72.2   | 46.0               | 20.0 | 28.1 | 59.7                      | 20.4      | 19.9  |
| 5 to 10                   | 134               | 905                      | 770                          | 2593                 | 282  | 626.5  | 2301                       | 90  | 318.6  | 376                            | 25   | 131.1  | 44.0                        | 5.0  | 19.4 | 310                          | 67   | 176.7  | 44.6               | 16.8 | 30.7 | 50.9                      | 20.9      | 28.2  |
| 10 to 15                  | 64                | 752                      | 688                          | 1805                 | 491  | 895.0  | 918                        | 100 | 330.5  | 432                            | 112  | 214.6  | 39.6                        | 8.1  | 18.3 | 546                          | 210  | 349.9  | 42.0               | 16.9 | 32.6 | 36.9                      | 24.0      | 39.1  |
| 15 to 20                  | 30                | 514                      | 482                          | 1402                 | 830  | 1131.7 | 877                        | 132 | 366.9  | 381                            | 135  | 238.8  | 23.7                        | 8.4  | 13.9 | 717                          | 348  | 529.9  | 42.2               | 24.8 | 32.7 | 32.4                      | 21.1      | 46.5  |
| 20 to 25                  | 23                | 500                      | 473                          | 3113                 | 898  | 1442.5 | 2045                       | 155 | 496.7  | 703                            | 118  | 303.0  | 33.5                        | 4.9  | 13.0 | 838                          | 471  | 642.7  | 32.1               | 23.4 | 31.3 | 34.4                      | 21.0      | 44.6  |
| 25 to 30                  | 8                 | 211                      | 203                          | 3367                 | 1125 | 1784.9 | 2013                       | 48  | 421.1  | 1009                           | 195  | 605.9  | 34.8                        | 7.5  | 23.0 | 956                          | 538  | 757.9  | 39.8               | 21.5 | 29.9 | 23.6                      | 33.9      | 42.5  |
| 30 to 35                  | 7                 | 220                      | 213                          | 2530                 | 1414 | 1941.3 | 799                        | 83  | 496.9  | 884                            | 306  | 645.3  | 26.7                        | 10.2 | 20.5 | 883                          | 680  | 799.1  | 30.3               | 21.9 | 26.3 | 25.6                      | 33.2      | 41.2  |
| 35 to 40                  | 7                 | 256                      | 248                          | 3307                 | 1546 | 2247.9 | 1512                       | 117 | 622.1  | 1078                           | 336  | 567.1  | 29.9                        | 8.6  | 15.5 | 1201                         | 914  | 1058.6 | 35.3               | 25.1 | 29.9 | 27.7                      | 25.2      | 47.1  |
| 40 to 45                  | 8                 | 345                      | 336                          | 3761                 | 1770 | 2494.3 | 1216                       | 184 | 420.4  | 1353                           | 507  | 948.4  | 31.6                        | 11.8 | 22.0 | 1272                         | 960  | 1125.5 | 29.6               | 22.9 | 26.8 | 16.9                      | 38.0      | 45.1  |
| 45 to 50                  | 6                 | 283                      | 277                          | 4051                 | 1613 | 2923.0 | 1274                       | 104 | 326.3  | 1617                           | 455  | 1331.3 | 34.4                        | 10.1 | 28.2 | 1659                         | 1050 | 1265.3 | 36.1               | 23.9 | 27.4 | 11.2                      | 45.6      | 43.3  |
| 50 to 55                  | 5                 | 262                      | 256                          | 3002                 | 2325 | 2805.2 | 536                        | 177 | 307.6  | 1461                           | 382  | 1145.6 | 27.6                        | 7.3  | 21.9 | 1361                         | 1257 | 1352.0 | 29.0               | 24.5 | 26.4 | 11.0                      | 40.8      | 48.2  |
| 55 to 60                  | 1                 | 59                       | 58                           | 3437                 | 3437 | 3437.0 | 489                        | 489 | 489.0  | 1311                           | 1311 | 1311.0 | 22.2                        | 22.2 | 22.2 | 1637                         | 1637 | 1637.0 | 28.2               | 28.2 | 28.2 | 14.2                      | 38.1      | 47.6  |
| 60 to 65                  | 6                 | 376                      | 366                          | 3817                 | 2231 | 3164.0 | 1176                       | 96  | 330.5  | 1705                           | 757  | 1291.2 | 28.0                        | 12.0 | 20.6 | 1758                         | 1378 | 1542.3 | 28.4               | 22.2 | 25.3 | 10.4                      | 40.8      | 48.7  |
| 65 to 70                  | 4                 | 271                      | 266                          | 3806                 | 3346 | 3353.3 | 582                        | 206 | 364.8  | 1637                           | 938  | 1377.5 | 23.7                        | 13.6 | 20.3 | 1963                         | 1673 | 1791.0 | 28.9               | 25.3 | 26.9 | 10.3                      | 39.0      | 50.7  |
| 70 to 75                  | 2                 | 140                      | 138                          | 3782                 | 3160 | 3471.0 | 285                        | 163 | 224.0  | 1645                           | 1386 | 1515.5 | 23.5                        | 19.8 | 21.7 | 1852                         | 1611 | 1731.5 | 26.8               | 23.3 | 25.1 | 6.5                       | 43.7      | 49.9  |
| 75 to 80                  | 4                 | 304                      | 297                          | 4517                 | 3025 | 3934.5 | 600                        | 293 | 444.5  | 2178                           | 1051 | 1648.5 | 29.0                        | 13.6 | 21.7 | 2126                         | 1681 | 1841.5 | 28.3               | 22.7 | 24.8 | 11.3                      | 41.9      | 46.8  |
| 80 to 85                  | 3                 | 248                      | 243                          | 5120                 | 3698 | 4174.3 | 779                        | 369 | 528.0  | 2285                           | 1005 | 1484.3 | 27.5                        | 12.4 | 18.0 | 2399                         | 2010 | 2162.0 | 29.3               | 24.2 | 26.7 | 12.6                      | 35.6      | 51.8  |
| 85 to 90                  | 2                 | 172                      | 169                          | 6200                 | 4727 | 5463.5 | 2400                       | 578 | 1489.0 | 1937                           | 1594 | 1765.5 | 22.3                        | 18.8 | 20.5 | 2212                         | 2206 | 2209.0 | 26.3               | 26.0 | 26.1 | 27.3                      | 32.3      | 40.4  |
| 90 to 95                  | 4                 | 370                      | 364                          | 5203                 | 4360 | 4751.3 | 1125                       | 474 | 850.8  | 1528                           | 1283 | 1425.3 | 16.4                        | 14.9 | 15.4 | 2596                         | 2153 | 2475.3 | 28.7               | 23.7 | 27.2 | 17.9                      | 30.0      | 52.1  |
| 95 to 100                 | 2                 | 193                      | 188                          | 5095                 | 4228 | 4661.5 | 610                        | 285 | 447.5  | 2120                           | 1590 | 1855.0 | 21.9                        | 16.6 | 19.2 | 2365                         | 2353 | 2359.0 | 25.2               | 25.0 | 25.1 | 9.6                       | 39.8      | 50.6  |
| 100 to 105                | 2                 | 202                      | 200                          | 5816                 | 5218 | 5517.0 | 1374                       | 380 | 877.0  | 2183                           | 1720 | 1951.5 | 21.6                        | 17.0 | 19.3 | 2722                         | 2655 | 2688.5 | 27.2               | 26.6 | 26.9 | 15.9                      | 35.4      | 48.7  |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |        |                                |      |        |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 16.3                      | 428               | 6962                     | 6508                         | 6200                 | 162  | 1084.1 | 2400                       | 32  | 336.7  | 2285                           | 20   | 311.7  | 50.5                        | 4.9  | 19.2 | 2722                         | 22   | 435.7  | 46.0               | 16.8 | 28.7 | 31.1                      | 28.8      | 40.2  |

<sup>a</sup>Based on averages per flight.

TABLE IV.- Continued

(b) Class B, heavy piston

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 45                | 163                      | 118                          | 1173                 | 191  | 356.8  | 983                        | 90  | 176.8 | 145                            | 18  | 99.2  | 36.3                        | 4.5  | 27.4 | 140                          | 26   | 80.8   | 46.6               | 20.0 | 30.8 | 49.6                      | 27.8      | 22.7  |
| 5 to 10                   | 105               | 719                      | 614                          | 1302                 | 285  | 520.8  | 820                        | 67  | 216.4 | 360                            | 45  | 146.9 | 40.0                        | 5.6  | 21.4 | 270                          | 94   | 157.5  | 39.3               | 18.8 | 26.9 | 41.6                      | 28.2      | 30.2  |
| 10 to 15                  | 188               | 2230                     | 2041                         | 1308                 | 425  | 730.3  | 755                        | 80  | 250.6 | 479                            | 71  | 192.7 | 37.4                        | 7.1  | 16.2 | 529                          | 178  | 287.1  | 48.1               | 17.7 | 26.4 | 34.3                      | 26.4      | 39.3  |
| 15 to 20                  | 94                | 1577                     | 1482                         | 1821                 | 570  | 1024.2 | 940                        | 49  | 284.8 | 550                            | 126 | 249.7 | 30.7                        | 7.0  | 14.9 | 899                          | 274  | 489.7  | 49.9               | 18.5 | 31.1 | 27.8                      | 24.4      | 47.8  |
| 20 to 25                  | 36                | 794                      | 756                          | 2038                 | 748  | 1216.2 | 914                        | 58  | 259.1 | 838                            | 134 | 327.5 | 41.9                        | 6.4  | 14.8 | 877                          | 301  | 629.6  | 40.9               | 15.8 | 30.0 | 21.3                      | 26.9      | 51.8  |
| 25 to 30                  | 21                | 554                      | 533                          | 1887                 | 1064 | 1351.3 | 630                        | 88  | 281.6 | 395                            | 198 | 269.1 | 13.7                        | 7.6  | 10.2 | 1165                         | 525  | 800.6  | 44.8               | 21.0 | 31.5 | 20.8                      | 19.9      | 59.3  |
| 30 to 35                  | 13                | 415                      | 401                          | 2359                 | 1050 | 1490.4 | 974                        | 88  | 271.7 | 470                            | 214 | 313.9 | 15.7                        | 6.9  | 9.8  | 1349                         | 587  | 904.7  | 43.5               | 19.6 | 29.3 | 18.2                      | 21.1      | 60.7  |
| 35 to 40                  | 3                 | 107                      | 103                          | 3207                 | 1590 | 2229.0 | 1611                       | 184 | 779.7 | 504                            | 420 | 457.3 | 14.4                        | 11.7 | 12.8 | 1148                         | 842  | 992.0  | 33.8               | 24.8 | 28.9 | 35.0                      | 20.5      | 44.5  |
| 40 to 45                  | 1                 | 44                       | 43                           | 1638                 | 1638 | 1638.0 | 246                        | 246 | 246.0 | 390                            | 390 | 390.0 | 8.9                         | 8.9  | 8.9  | 1002                         | 1002 | 1002.0 | 23.3               | 23.3 | 23.3 | 15.0                      | 23.8      | 61.2  |
| 45 to 50                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 50 to 55                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 55 to 60                  | 1                 | 57                       | 56                           | 2241                 | 2241 | 2241.0 | 360                        | 360 | 360.0 | 495                            | 495 | 495.0 | 8.7                         | 8.7  | 8.7  | 1386                         | 1386 | 1386.0 | 24.8               | 24.8 | 24.8 | 16.1                      | 22.1      | 61.8  |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 13.1                      | 507               | 6660                     | 6147                         | 3207                 | 191  | 801.6  | 1611                       | 49  | 249.1 | 838                            | 18  | 203.8 | 41.9                        | 4.5  | 15.5 | 1386                         | 26   | 348.7  | 49.9               | 15.8 | 28.8 | 31.1                      | 25.4      | 43.5  |

<sup>a</sup>Based on averages per flight.

TABLE IV.- Concluded  
(c) Class C, heavy turbine

| Spreading runs per flight | Number of flights | Number of spreading runs | Number of turns between runs | Time per flight, sec |      |        | Ferry time per flight, sec |     |       | Spreading time per flight, sec |     |       | Time per spreading run, sec |      |      | Turning time per flight, sec |      |        | Time per turn, sec |      |      | Percent flight time for - |           |       |
|---------------------------|-------------------|--------------------------|------------------------------|----------------------|------|--------|----------------------------|-----|-------|--------------------------------|-----|-------|-----------------------------|------|------|------------------------------|------|--------|--------------------|------|------|---------------------------|-----------|-------|
|                           |                   |                          |                              | Max                  | Min  | Av     | Max                        | Min | Av    | Max                            | Min | Av    | Max                         | Min  | Av   | Max                          | Min  | Av     | Max                | Min  | Av   | Ferry                     | Spreading | Turns |
| 0 to 5                    | 70                | 256                      | 186                          | 708                  | 184  | 282.2  | 398                        | 56  | 129.3 | 199                            | 20  | 86.6  | 49.8                        | 6.7  | 23.7 | 111                          | 28   | 66.3   | 37.0               | 15.3 | 25.0 | 45.8                      | 30.7      | 23.5  |
| 5 to 10                   | 94                | 608                      | 513                          | 894                  | 219  | 402.1  | 567                        | 70  | 147.2 | 206                            | 52  | 127.0 | 30.0                        | 10.4 | 19.6 | 201                          | 62   | 127.9  | 34.8               | 15.5 | 23.4 | 36.6                      | 31.6      | 31.8  |
| 10 to 15                  | 60                | 700                      | 640                          | 1882                 | 396  | 685.9  | 1276                       | 49  | 235.5 | 441                            | 89  | 189.6 | 40.1                        | 7.6  | 16.2 | 423                          | 151  | 260.9  | 34.5               | 16.8 | 24.5 | 34.3                      | 27.6      | 38.0  |
| 15 to 20                  | 40                | 683                      | 643                          | 2761                 | 534  | 1215.0 | 1936                       | 50  | 498.1 | 763                            | 96  | 307.4 | 42.4                        | 6.0  | 18.0 | 554                          | 261  | 409.6  | 32.5               | 16.3 | 25.5 | 41.0                      | 25.3      | 33.7  |
| 20 to 25                  | 26                | 571                      | 544                          | 2454                 | 714  | 1348.3 | 1382                       | 73  | 484.1 | 628                            | 165 | 347.1 | 28.5                        | 5.3  | 15.8 | 675                          | 411  | 517.1  | 31.7               | 20.4 | 24.7 | 35.9                      | 25.7      | 38.4  |
| 25 to 30                  | 22                | 587                      | 562                          | 6059                 | 912  | 2032.0 | 4817                       | 131 | 959.3 | 625                            | 243 | 406.1 | 25.0                        | 8.7  | 15.2 | 1252                         | 489  | 666.6  | 52.2               | 16.9 | 26.1 | 47.2                      | 20.0      | 32.8  |
| 30 to 35                  | 18                | 572                      | 552                          | 3234                 | 1035 | 1807.8 | 1958                       | 84  | 674.8 | 710                            | 200 | 400.9 | 22.9                        | 6.7  | 12.6 | 956                          | 536  | 732.1  | 31.7               | 17.9 | 24.0 | 37.3                      | 22.2      | 40.5  |
| 35 to 40                  | 14                | 520                      | 502                          | 4384                 | 1350 | 2135.9 | 2791                       | 135 | 800.0 | 911                            | 300 | 489.8 | 25.3                        | 7.9  | 13.2 | 1121                         | 596  | 846.1  | 31.1               | 17.0 | 23.6 | 37.5                      | 22.9      | 39.6  |
| 40 to 45                  | 4                 | 166                      | 162                          | 3133                 | 1321 | 2273.0 | 1381                       | 261 | 809.5 | 821                            | 268 | 542.8 | 19.1                        | 6.7  | 13.1 | 1000                         | 792  | 920.8  | 25.6               | 20.3 | 22.7 | 35.6                      | 23.9      | 40.5  |
| 45 to 50                  | 6                 | 279                      | 273                          | 2961                 | 1613 | 2292.8 | 1038                       | 90  | 614.5 | 1029                           | 342 | 655.2 | 22.9                        | 7.1  | 14.1 | 1276                         | 849  | 1023.2 | 29.0               | 19.3 | 22.5 | 26.8                      | 28.6      | 44.6  |
| 50 to 55                  | 3                 | 161                      | 158                          | 3290                 | 2099 | 2588.3 | 1351                       | 316 | 729.0 | 575                            | 385 | 476.7 | 10.8                        | 7.1  | 8.9  | 1471                         | 1208 | 1382.7 | 27.8               | 23.2 | 26.3 | 28.2                      | 18.4      | 53.4  |
| 55 to 60                  | 1                 | 55                       | 54                           | 3146                 | 3146 | 3146.0 | 960                        | 960 | 960.0 | 644                            | 644 | 644.0 | 11.7                        | 11.7 | 11.7 | 1542                         | 1542 | 1542.0 | 28.6               | 28.6 | 28.6 | 30.5                      | 20.5      | 49.0  |
| 60 to 65                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 65 to 70                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 70 to 75                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 75 to 80                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 80 to 85                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 85 to 90                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 90 to 95                  |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 95 to 100                 |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 100 to 105                |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| Total sample              |                   |                          |                              |                      |      |        |                            |     |       |                                |     |       |                             |      |      |                              |      |        |                    |      |      |                           |           |       |
| 14.4                      | 358               | 5158                     | 4789                         | 6059                 | 184  | 903.0  | 4817                       | 49  | 346.5 | 1029                           | 32  | 228.7 | 49.8                        | 5.3  | 15.9 | 1542                         | 28   | 327.8  | 52.2               | 15.3 | 24.5 | 38.4                      | 25.3      | 36.3  |

<sup>a</sup>Based on averages per flight.

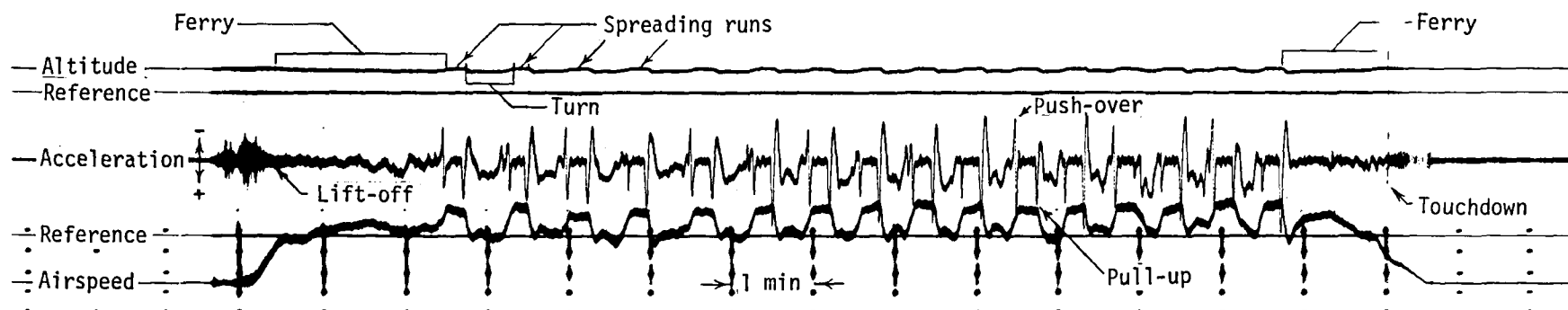


Figure 1.- Example of agricultural flight on VGH record.

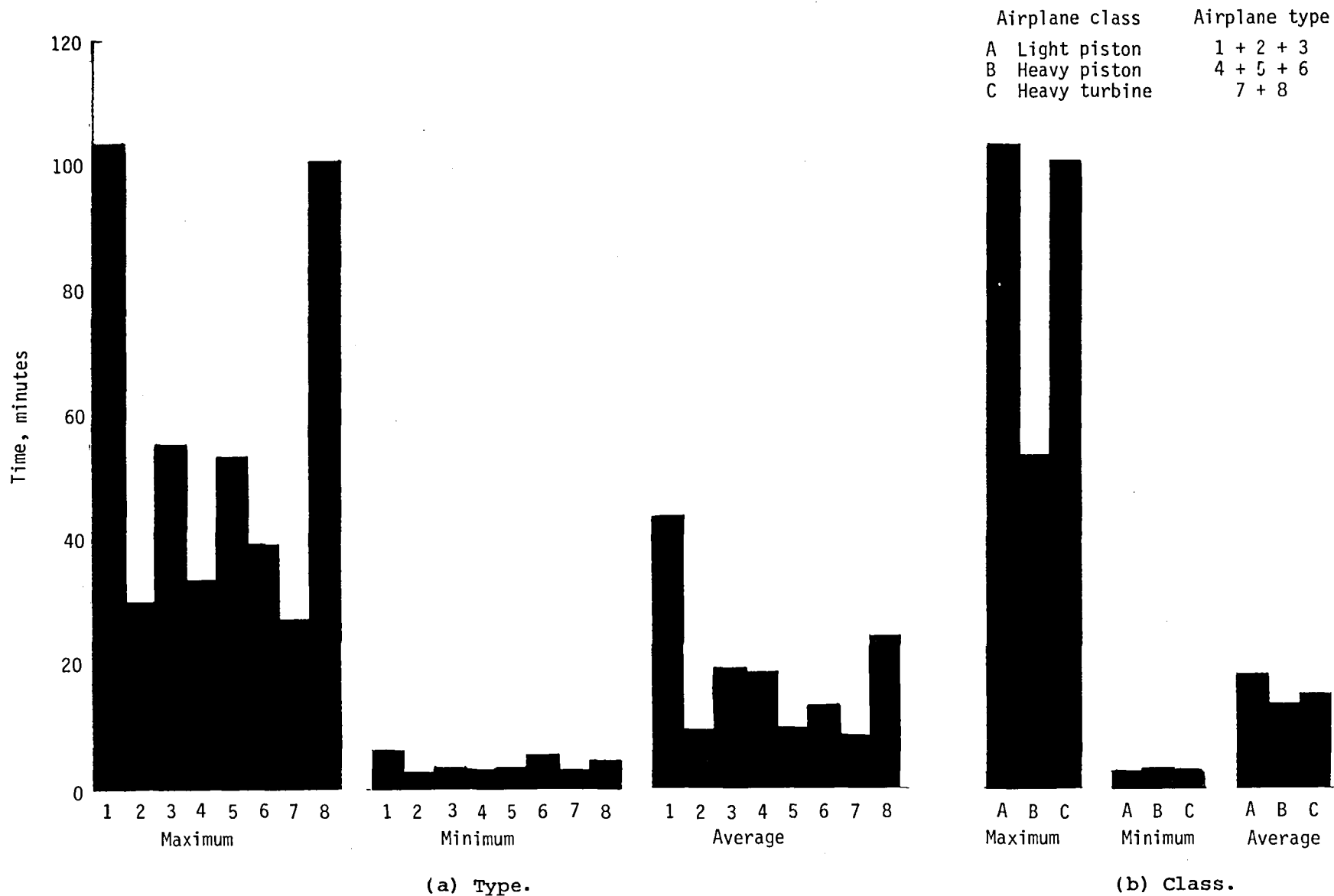


Figure 2.- Flight time for different airplane types and classes.

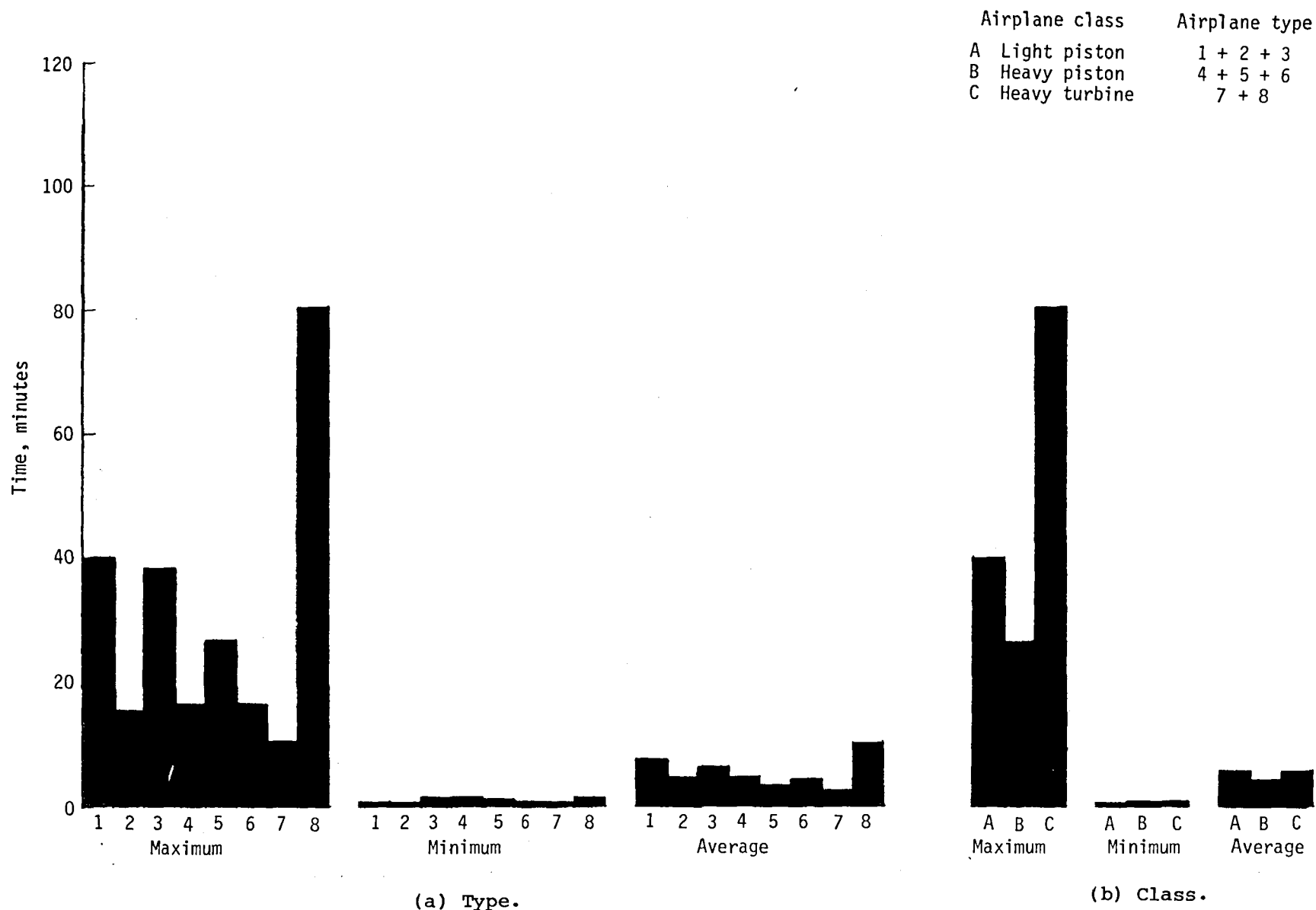


Figure 3.- Ferry time per flight for different airplane types and classes.

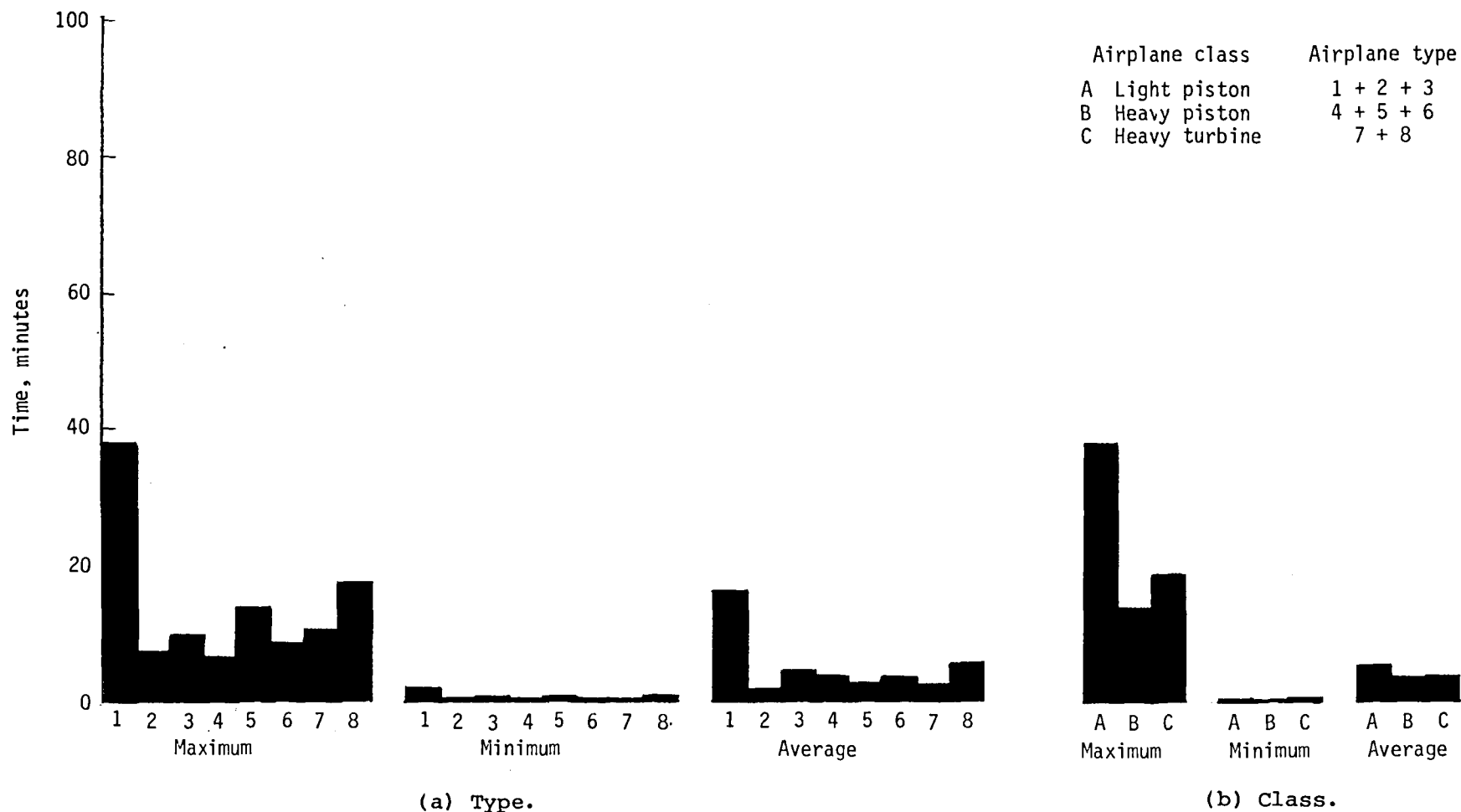


Figure 4.- Spreading time per flight for different airplane types and classes.

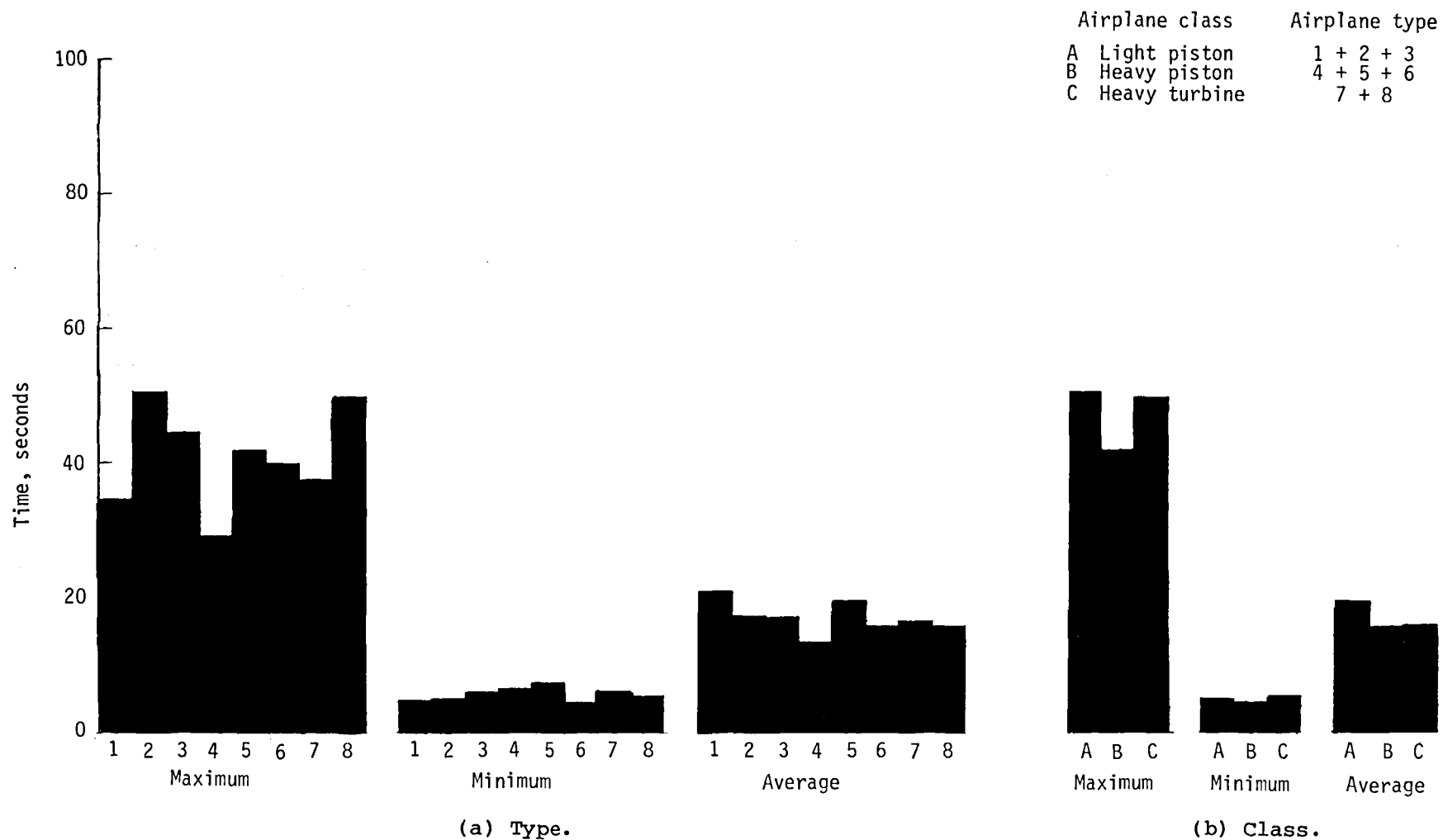


Figure 5.- Spreading time per run for different airplane types and classes.  
Maximum and minimum values are based on averages per flight.



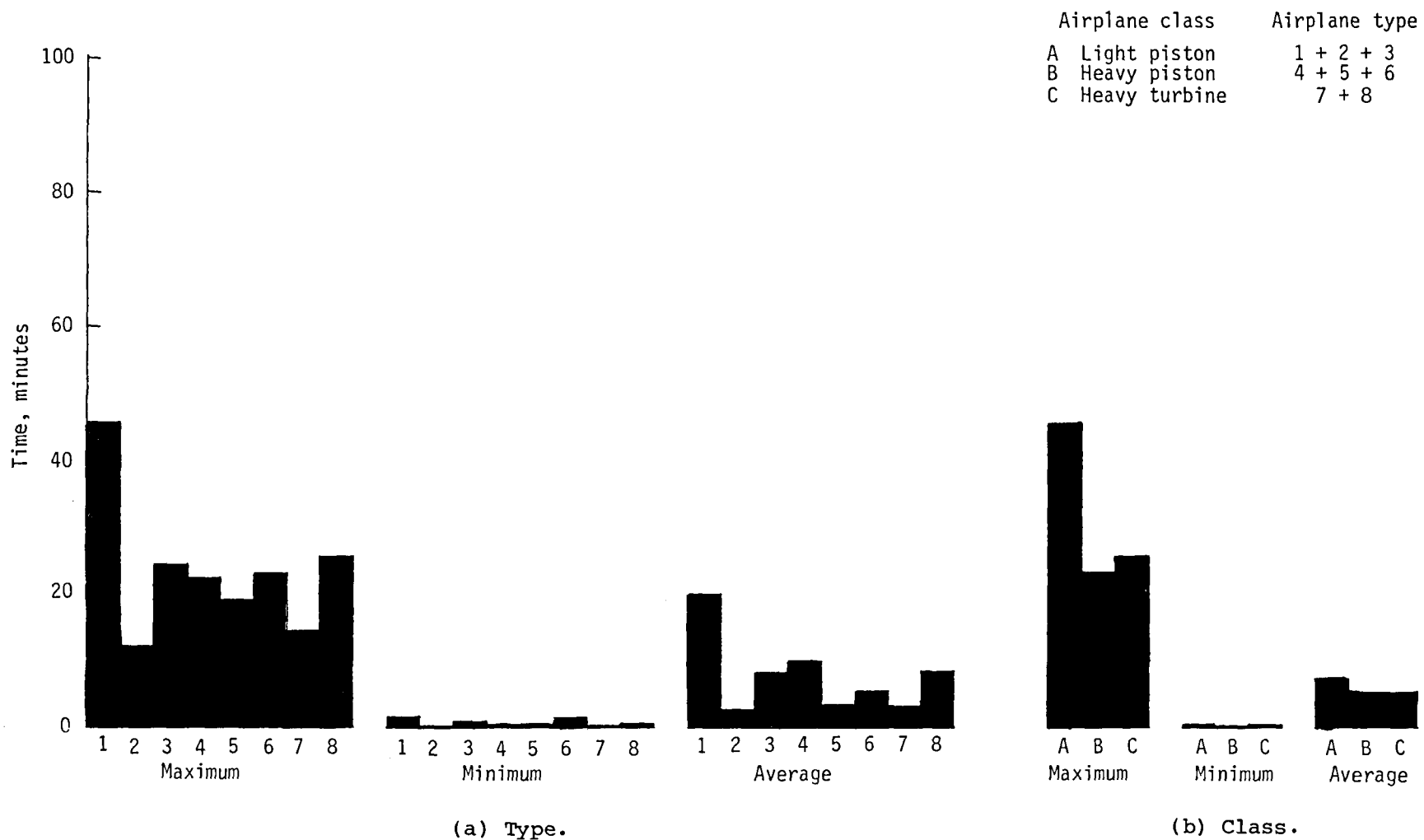


Figure 6.- Turning time for different airplane types and classes.

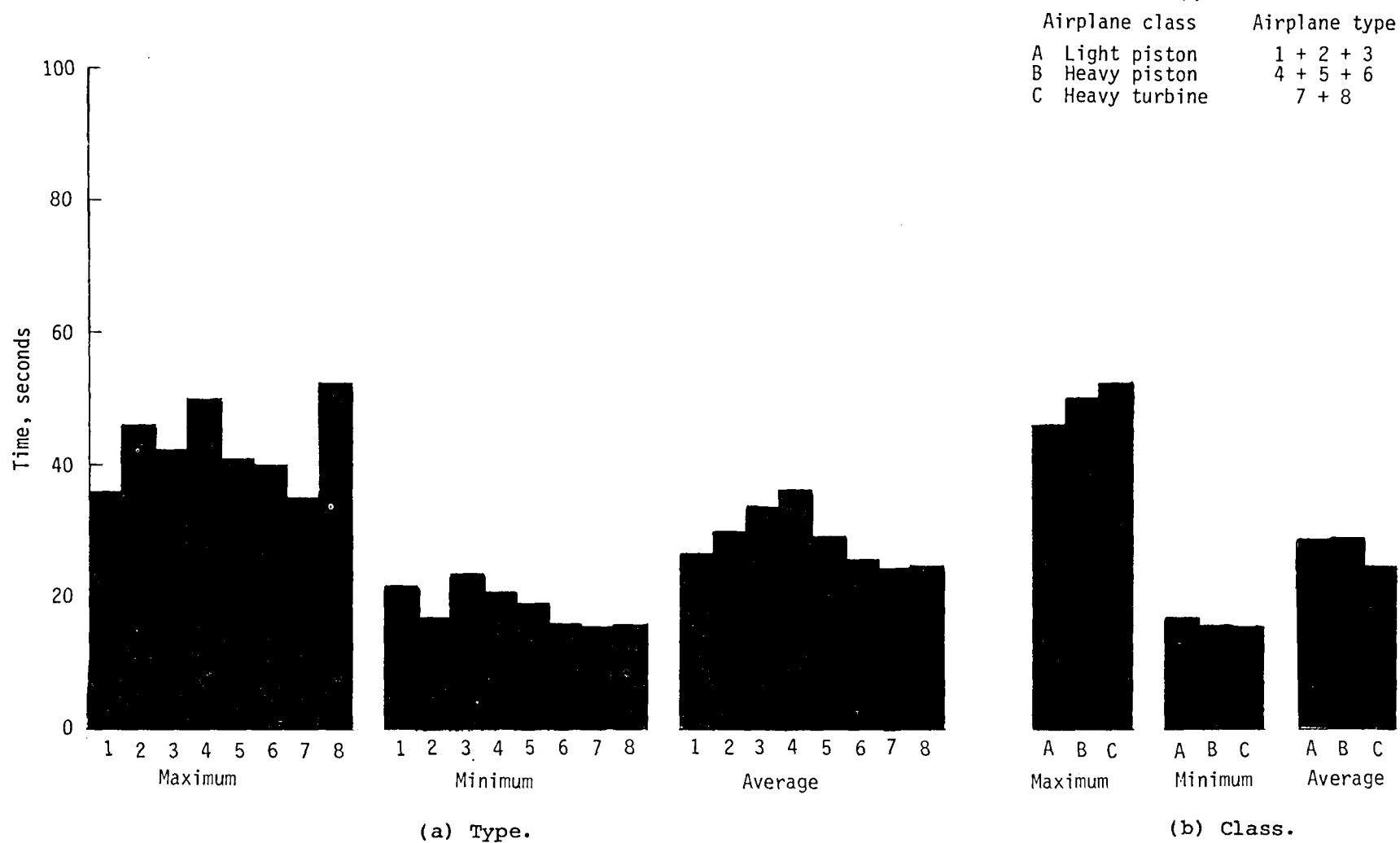


Figure 7.- Time per turn for different airplane types and classes.  
Maximum and minimum values are based on averages per flight.

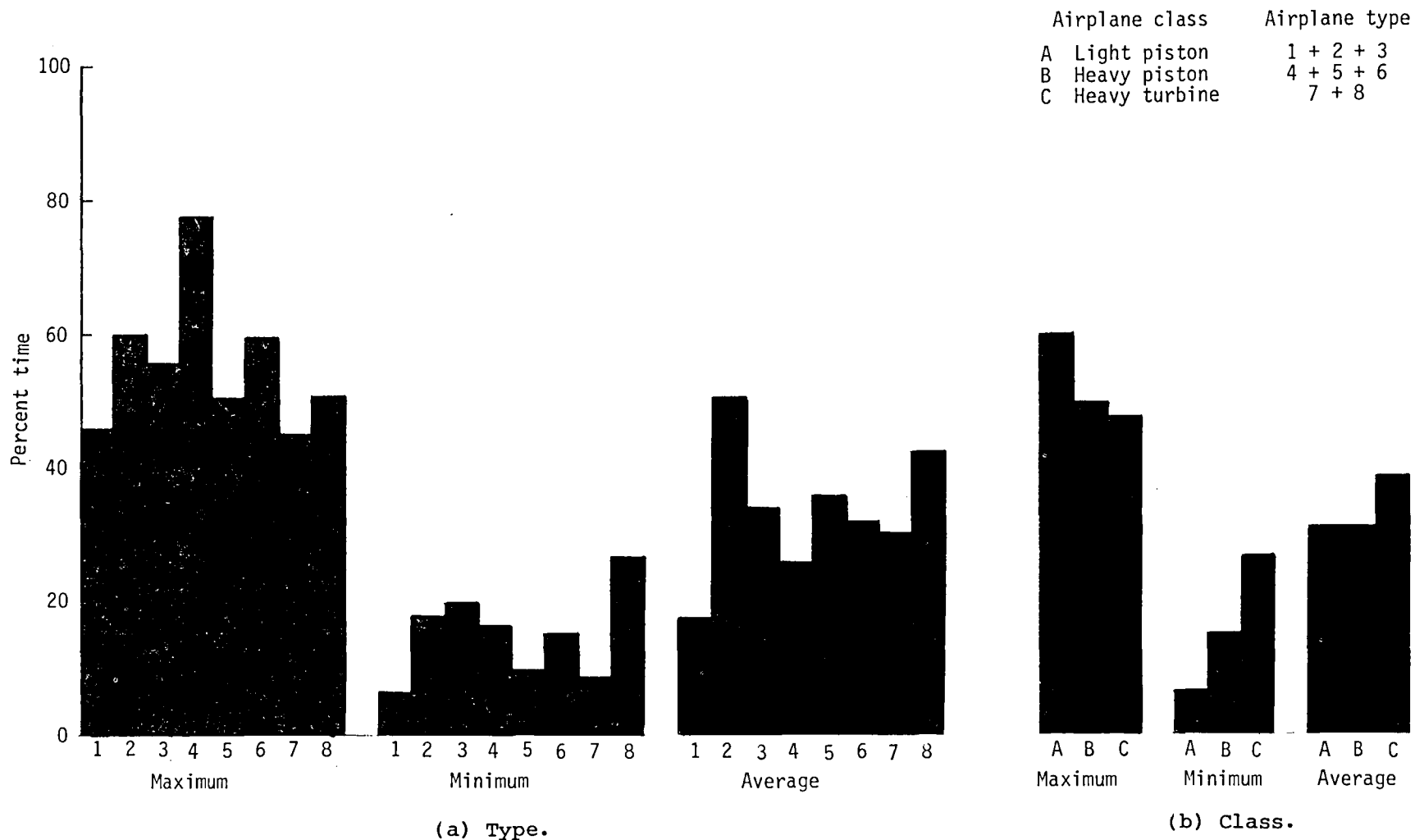


Figure 8. Percent of flight time used for ferrying for different airplane types and classes.

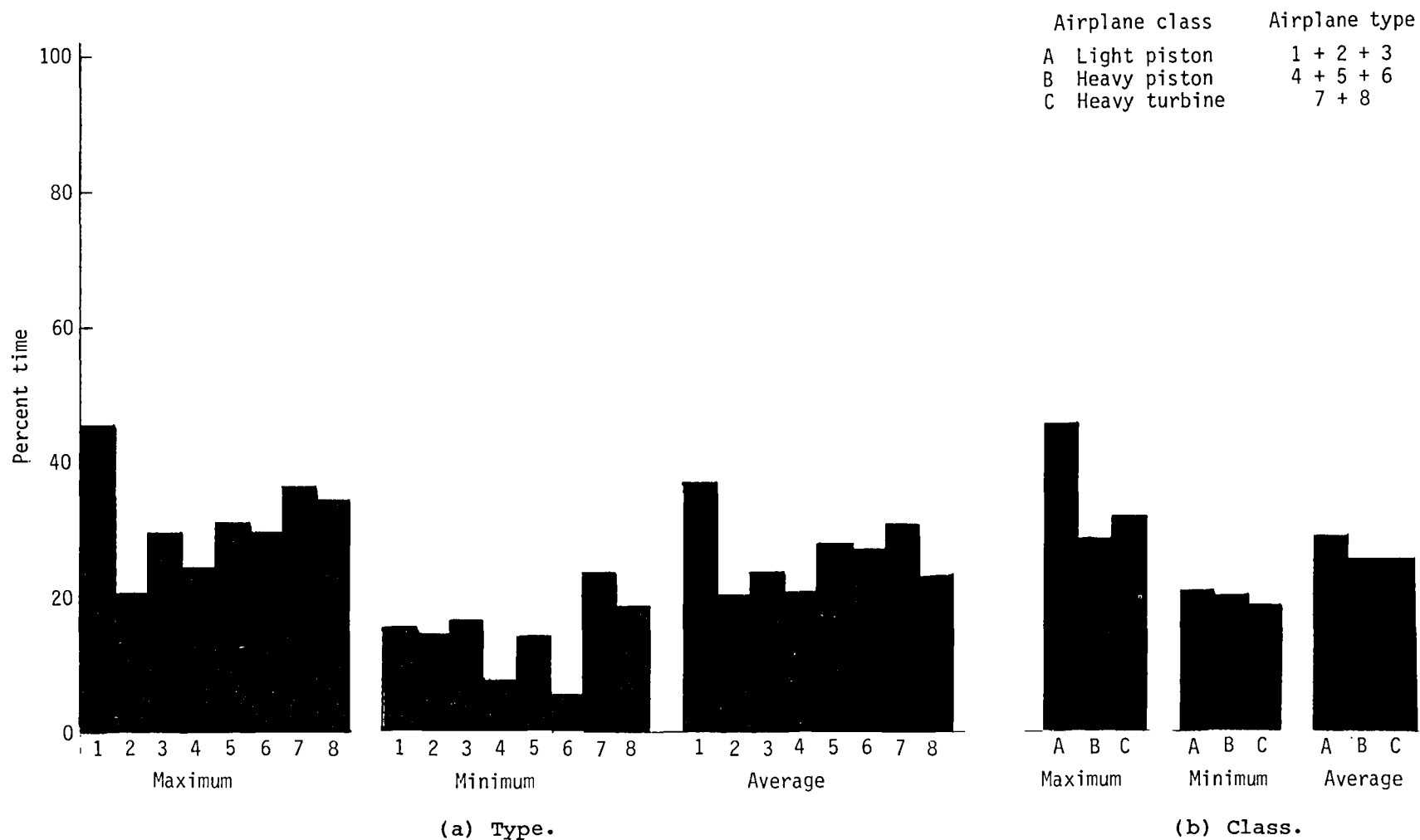


Figure 9.- Percent of flight time for spreading for different airplane types and classes.

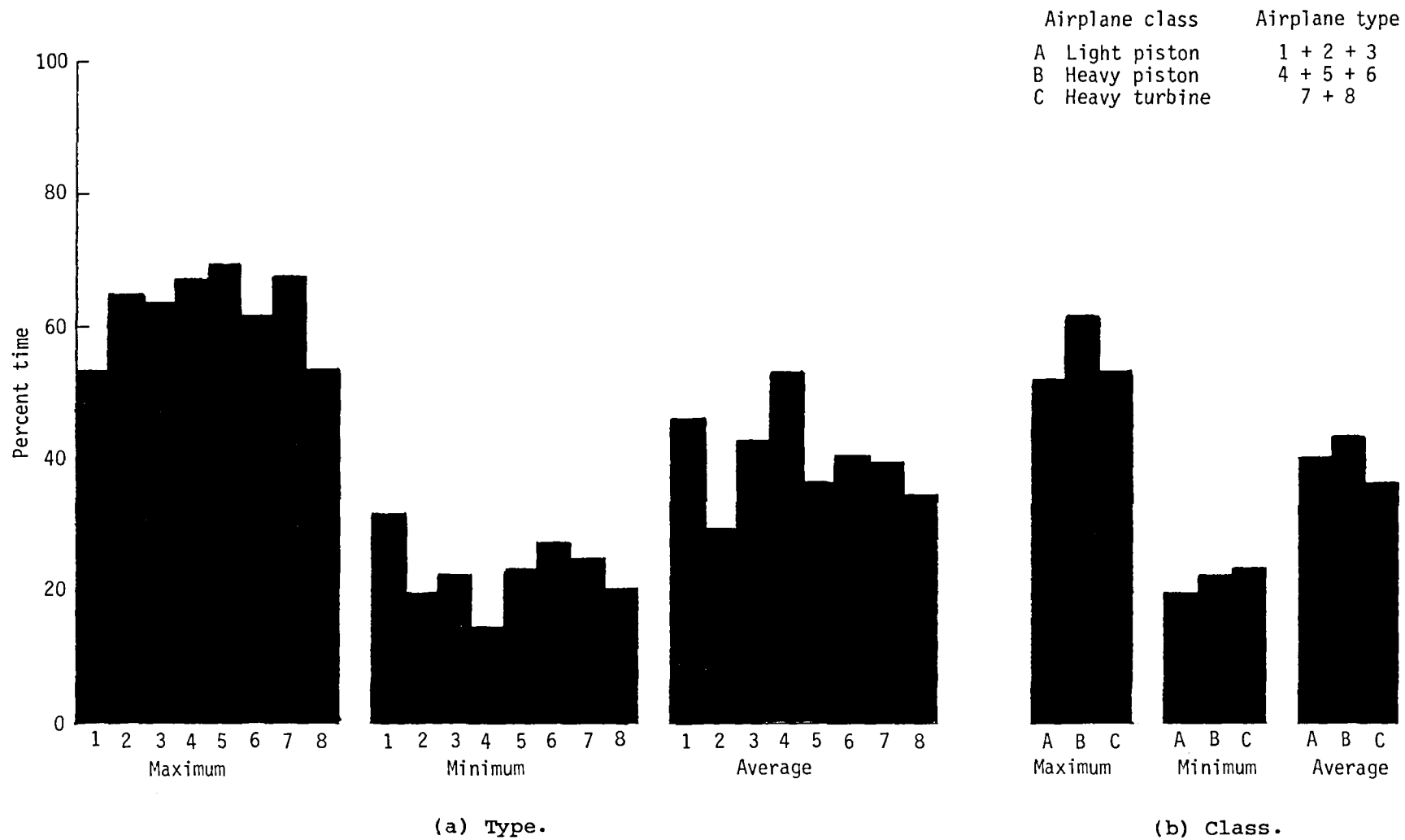


Figure 10.- Percent of flight time for turning for different airplane types and classes.

|  |  |                             |                  |   |  |
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